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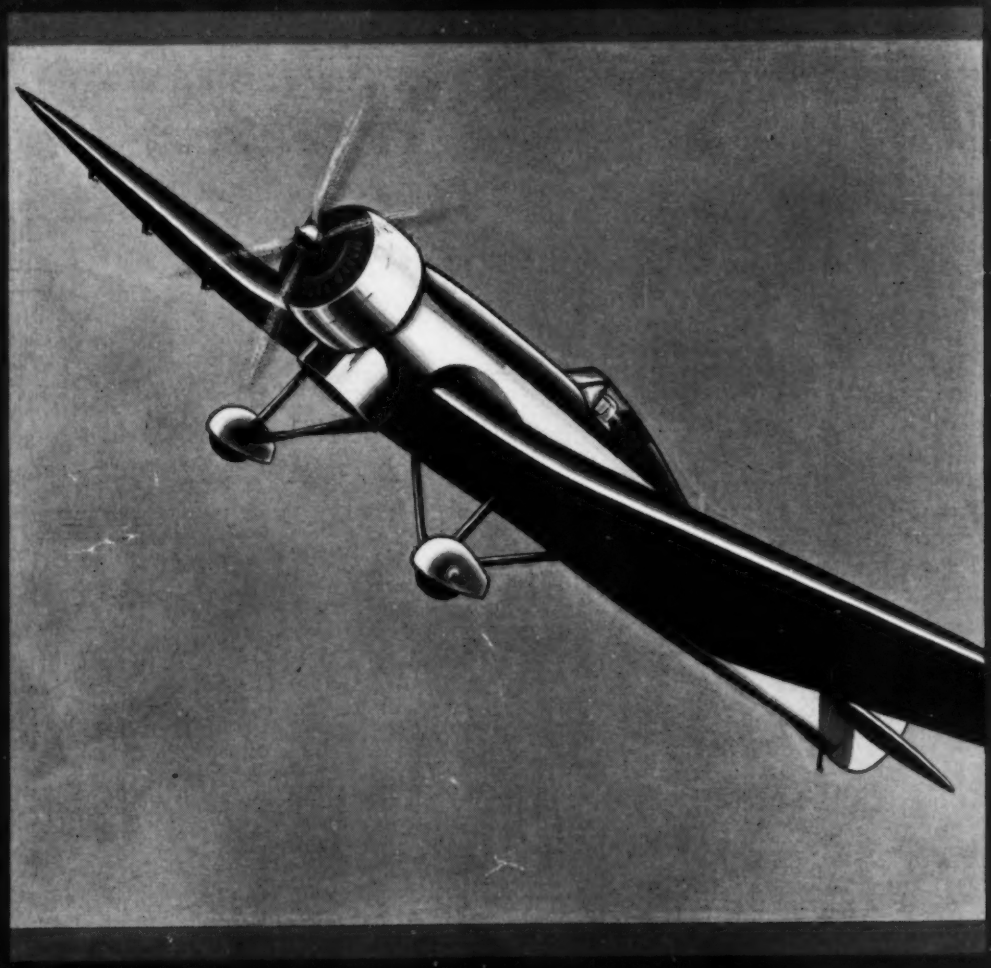

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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A Gyratory Milestone

IT is now possible to remark on the fact that Tuesday, November 24, 1936, deserves to be treated as a red-letter day in the history of flying. On that day a rotating-wing aircraft of helicopter type succeeded in remaining aloft for more than one hour; and what is, perhaps, more important still, it covered during that time a distance, over a closed circuit, of 27¼ miles. It was not the fact that a true helicopter established a speed of 26½ m.p.h. that was significant; but what *is* important is the fact that the machine stayed in the air for a considerable period, during which it flew circuits of a measured course, thereby showing that it was under proper control. The actual speed is, for the present, relatively unimportant. The machine was the Breguet-Dorand gyroplane, a description of which appeared in *Flight* of December 19, 1935.

Louis Breguet, the famous French pioneer aircraft constructor, has thus once again made history, and in this connection it is not without interest to recall that he began his aeronautical career with a helicopter which made its first "rise" (it could hardly be called a flight) as long ago as 1907. From that early machine, the Breguet-Richet, to the present Breguet-Dorand is a far cry, and during the interval between their production M. Breguet became famous as a designer and constructor of fixed-wing aircraft, the fact that this type offered an easier path to success doubtless having influenced M. Breguet as it influenced so many other early aeroplane designers. However, M. Breguet has never lost his faith in the ultimate success of the rotating-wing type, and he has backed his faith with prolonged research and a great deal of hard cash. That success is now within sight must be a source of gratification to M. Breguet, indeed, as it is to the rest of the aviation world.

Remembering how long it has taken Mr. de la Cierva to bring the autogiro to its present stage of development, it may be assumed that M. Breguet still has a great deal of development work to do before his gyroplane is a practical aircraft, but the one-hour flight by M. Claisse on November 24 shows that fundamentally the problem of lift and propulsion, and the more difficult one of control, has been solved. Doubtless the rest is a question of detail improvement, of simplification, and of practical mechanical engineering.

Perhaps it was to be expected, but it is nevertheless interesting to have M. Breguet confirm what Mr. de la Cierva stated long ago, that a rotary-wing aircraft is more efficient than a fixed-wing aircraft at very high and very low speeds. Mr. de la Cierva did not give actual figures, but he showed two "horse-power required" curves, one for an average aeroplane and one for the autogiro. The two curves crossed one another towards the two ends of the speed scale.

Efficiency

Monsieur Breguet has calculated that for a very refined design of his gyroplane a power of 0.06 b.h.p. per pound weight is required, or a power loading of 16.7 pounds per horse-power, at a speed of 217 m.p.h. Due to the fact that the relative drag of the gyroplane remains practically constant and at a minimum through a very large range of V/nD, M. Breguet estimates that at 700 km/h (435 m.p.h.) the same refined gyroplane will require but 0.168 h.p. per pound weight, or a power loading of 5.95 pounds per horse-power. When one remembers that the same machine is able to rise vertically, hover without forward speed, and descend vertically, one begins to realise the potentialities of the gyroplane. M. Breguet visualises a large gyroplane—amphibian, because of its ability to ascend and descend vertically—in which there is a central engine room with four engines driving the shafts of the lifting screws, and accessible by the engineers at all times, with the possibility of declutching any one engine for adjustments. In this way forced landings should be all but unknown. Undoubtedly a

great amount of work is still required before such a machine can be built and put into service, but in the meantime the flight made on November 24 gives hope of ultimate success.

The Cart and the Horse

VISITORS to the Paris Aero Show came back full of admiration for the generally high standard of the military aircraft exhibited. A few of them remembered that the *raison d'être* of military aircraft is to carry armament, and the most effective armament at that. The extensive use on French and other military aircraft of *canons*, either fired through the airscrew, as on those machines fitted with *Moteurs canons*, or externally to the airscrew disc, served as a somewhat unpleasant reminder that in this country we seem largely to have overlooked the fact that aircraft guns *can* be improved. An examination of the armament of British military aircraft is not reassuring, and leaves one with the feeling that machine guns on aircraft are much about what they were when the war 1914-18 finished.

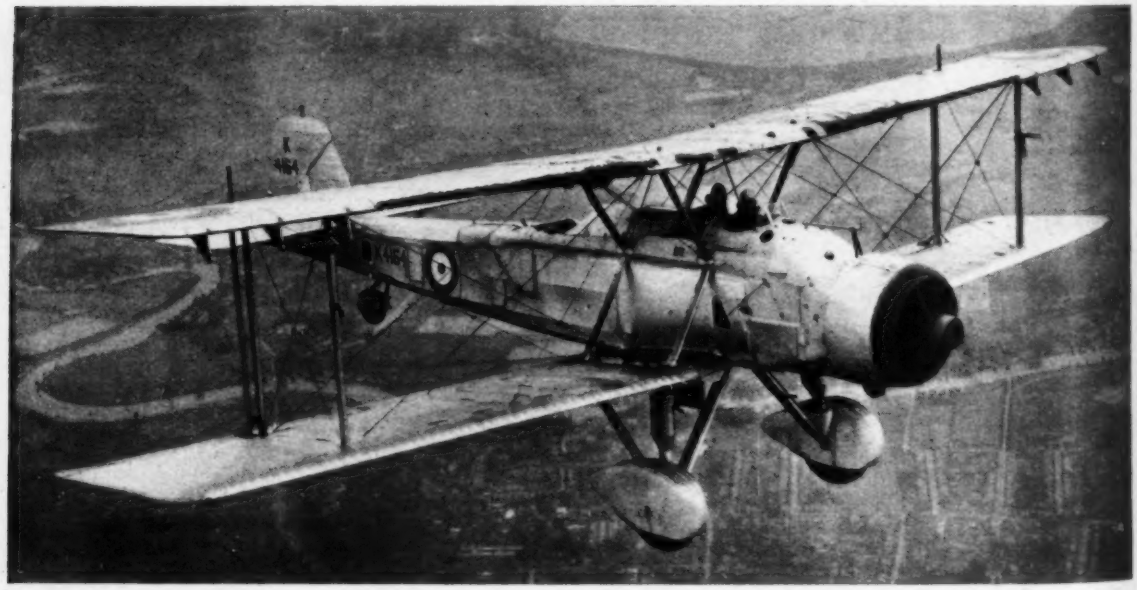
It is extraordinary to contemplate the frame of mind which can consider spending hundreds of thousands of pounds sterling every year on improving aircraft and aero engines, and which yet can tolerate the continued use of what can now only be regarded as antiquated armament. Both aeroplanes and engines have improved out of all recognition, yet no one would claim that anything like comparable progress has been made by the gun manufacturers.

Reverting again to the Paris Aero Show, several visitors had an opportunity of seeing some of the results of the experimental work which the Hispano-Suiza firm has been doing. One hears tales of centre-sections hit by *canons*, which showed a small, clean hole at the point of entry, but an area of several square feet completely torn away at the point of exit. In this country, on the other hand, we seem to be thinking solely in terms of multiplying the number of existing machine guns carried in a single aircraft, trusting to the resulting concentration of small-calibre fire to do damage equivalent to that wrought by the explosive shell of the *canon*.

Apart from the question of damage done in the event of a hit, there is that of relative effective range. Reliable figures are not easily come by, but in general it seems to be established that the effective range of the *canon* is anything up to twice that of the machine gun. It should be remembered that machine-gun bullets might well riddle the wings or fuselage of an aeroplane without doing any serious damage to the primary structure, while the explosive shell of the *canon* is almost certain to do serious damage if it hits at all, more particularly in the metal-clad structures which are now the vogue.

One Swallow . . . .

A half-hearted attempt was certainly made a year or two ago to try out the Vickers-Armstrong quick-firing gun in the Blackburn Perth flying boat, but nothing much seems to have come of the experiment. If the British arms manufacturers have not the enterprise to produce guns in keeping with modern needs, it is up to the Air Ministry to stir them up and to insist that something be done. If we are not mistaken, there never has been one of the latest type of foregin *canon* in this country, even for experimental tests. The nearest we have come to it seems to have been the importation of the American Browning machine gun some months ago. Even the Dewoitine monoplane bought by the Air Ministry last summer does not, it seems, have the latest type of *canon*, but merely the earlier Oerlikon. There is in informed circles a growing uneasiness and a feeling that steps should be taken to see that gun development does not lag behind that of aircraft and engines.



THE SAME ONLY DIFFERENT: Anyone could be excused for saying of the above view "It's an ordinary Vickers Vildebeest as used by the R.A.F." But that is not true. Note, for instance, that a long-chord cowling is fitted; this is not standard on the present Pegasus-engined type. Actually the machine has a Bristol Perseus sleeve-valve engine and is of a type adopted as Service equipment by the Air Ministry.

The Outlook

A Running Commentary on Air Topics

Not So Black

DURING the past few weeks there has been a tendency among people, both inside and outside the air transport business, to deprecate the standard of transport flying technique and experience of the pilots in this country. Not to mince words, they appear to think "that we are always crashing aeroplanes; that the German, French and Swiss machines always get through; and that hardly anybody here has had any real experience of night flying."

Even if all these allegations were true, there would be some excuse for all but the long-distance Imperial Airways pilots in the fact that this is so small a country, with, so far, such limited ground equipment, so that no very useful internal experience can be gained.

As far as accidents are concerned, little is heard of those experienced abroad, and the casual newspaper reader might obtain a totally incorrect idea of relative safety. In fact, of course, every air line company appears to pass through periodical "black" phases, and over a number of years the average for all companies is about the same.

In this connection, it is a pity that accident statistics are not available in so complete a tabulated form here as in America; that accident reports are not published sooner; and that these reports are neither as detailed nor as fearless as those, for instance, published by the Bureau of Air Commerce in America. Some of the latter are, if at times tedious, most beautifully arranged masses of detailed evidence piling up towards an almost inevitable conclusion.

Another Loch Ness Monster?

ALTHOUGH the Armstrong "Seadrome" scheme has been in existence for many years, little practical progress seems to have been made. This, however, does not, apparently, deter others from entering the same field, the latest addition to the "floating island" family of inventors being an Australian, Mr. M. E. Heiser.

The Heiser floating island is to be of horse-shoe plan form, with one limb forming the landing and taking-off deck and the other carrying an artificial lake for flying boats. The U-shaped floating island has been suggested before, by a Frenchman, if we are not mistaken. The use of "stopper buoys" is also a feature of the Armstrong seadromes. The main difference between the Heiser and the Armstrong schemes seems to be that whereas the latter is to be moored by a cable, the Heiser island will be kept in position by propellers driven by windmills.

Actually, the last-mentioned suggestion is not quite equivalent to sitting in a basket and lifting oneself by the handle. Some years ago a Frenchman produced a boat in which the water propeller was driven by a windmill, and in tests on the Seine the outfit actually worked quite well. And did not our own "Moore-Brab." drive a boat with a sort of rotor? However, he did not succeed in "steaming" straight into the wind, as Mr. Heiser proposes to do.

From a technical point of view, there is probably nothing very impossible about the scheme; cost seems to be the chief stumbling block. The price of building, equipping and placing such a floating island is likely to run into millions, and the revenue to be derived from landing fees would have to be fairly high to pay interest on the capital invested.

In this connection it is interesting to recall that in his recent speech at the annual meeting of Imperial Airways Sir Eric Geddes stated the interesting fact that on Imperial air routes every pound of pay load added represented an earning value of about £12 per annum. By reducing the range from about 2,000 miles to 700 miles, the fuel weight saved by the use of floating islands should represent a tidy increase in pay load on this basis, and if the intensity of traffic were sufficient, the balance sheet might look better than one would imagine at first sight.

The New Flying Boats

SOME extremely interesting facts and figures are given in the paper which Mr. Arthur Gouge, general manager of Short Brothers, is reading to the Royal Aeronautical Society to-night. The information given confirms the high opinion which most technicians have formed of the new Empire flying boats.

The paper discloses the fact that *Caledonia*, the long-range boat which is to make the first experimental flights across the Atlantic, has a gross weight of 45,000 lb. compared with the 40,500 lb. of the Empire boats. In spite of the greater gross weight, the take-off occupies 30.5 seconds from opening the throttles, and the run is 795 yards.

Another interesting fact brought out by Mr. Gouge's paper is that when carrying 1,000 lb. of mails *Caledonia* has a still-air range of 3,800 miles when flying at a cruising speed of 131 m.p.h. Against a head wind of 40 m.p.h. the best cruising speed is about 138 m.p.h., when the range is about 2,700 miles. At the usual cruising speed of the boat, namely, 160 m.p.h., the range is still nearly 2,500 miles against a 40 m.p.h head wind.

The Diesel Problem Again

"*I MAY* be peculiar, but I do object to being burnt alive," said "Moore-Brab" at the Chelsea College dinner the other evening, when he pleaded for a resumption of Diesel aero engine development. Although it has yet to be proved that the Diesel engine does in fact give that freedom from fire risk which its advocates always claim, there is a growing volume of opinion that Great Britain is acting unwisely in shelving the problem of the Diesel aero engine, the more so as other countries, notably France and Germany, are devoting considerable attention to the matter. Germany in particular is putting a great effort into solving the numerous problems connected with the compression-ignition engine, and the Junkers firm has achieved a good deal of success with supercharging the Junkers Diesel, using an exhaust-driven supercharger.

Whether one shares "Moore-Brab's" fear of fire on board or not, there are other advantages inherent in the Diesel principle. For example, the need for elaborate screening of sparking plugs, leads and so forth disappears with the plugs, and radio operation benefits. Moreover, it is on long-range flights that radio is most needed, and it is only on flights of 2,000 miles or over that the Diesel can compete with the high-octane petrol fuel in economy. Surely, therefore, there is a very good case to be made out for developing the Diesel engine in this country for our long Atlantic routes of the near future.

The task is not one which private enterprise can undertake, and it will be necessary for the Air Ministry to help with financial assistance. The Director-General of Civil Aviation, Lt.-Col. Sir Francis Shelmerdine, is in sympathy with the subject, so perhaps we may expect to see the Diesel programme revived in the near future.

CONTINENTAL ENGINE PRACTICE EXAMINED

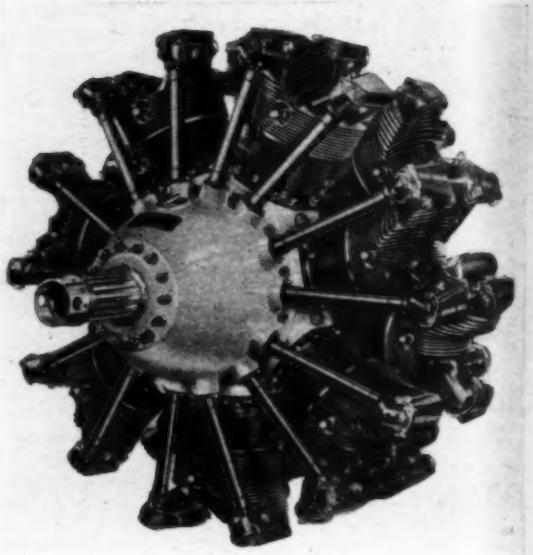
Modern Tendencies as Disclosed at the Paris Salon

By MAJOR G. P. BULMAN

In this article, Major G. P. Bulman, O.B.E., B.Sc., F.R.Ae.S., examines the Continental aero engines exhibited at the recent Paris Aero Show, and deals with them in a characteristically pertinent and critical manner that should be of value to all who are interested in modern engine design. Major Bulman is Assistant Director (Engines) in the Joint Directorate of Scientific Research and Technical Development, Air Ministry.

THE technical facts of the 15th International Aero Exhibition in Paris are common property, not only to those privileged to visit the Salon, but the others who remained to read the detailed descriptions and illustrations so adequately provided elsewhere; but the recorded impressions and reflections induced by such data in any one individual are necessarily entirely personal. He may find unexpected importance in this aspect and seem strangely to neglect that; be cheered or depressed; keenly interested or indifferent, subject only to the dictates and vagaries of his own personality.

It will, however, probably be generally accepted that the Salon of 1936 (void, unfortunately, of German and Italian representation) marked the advent of the twin-engined aeroplane, even in the fighter form. It confirmed, too, the continued upward swing of the air-cooled engine, though the radial form is no longer unchallenged in military types. More than ever is it patent that the orientation of aero engine design, be it liquid or air-cooled, radial or in-line, must be determined less on a weight-per-horse-power basis and more and more in terms of a power plant fashioned in strict and optimum conformity with the overall minimum drag characteristics of the modern aeroplane. In turn, that aeroplane's layout for military purposes must surely be judged not merely on performance sufficient as an end in itself, but rather the engagement of the enemy; either in the air, on land or on sea.

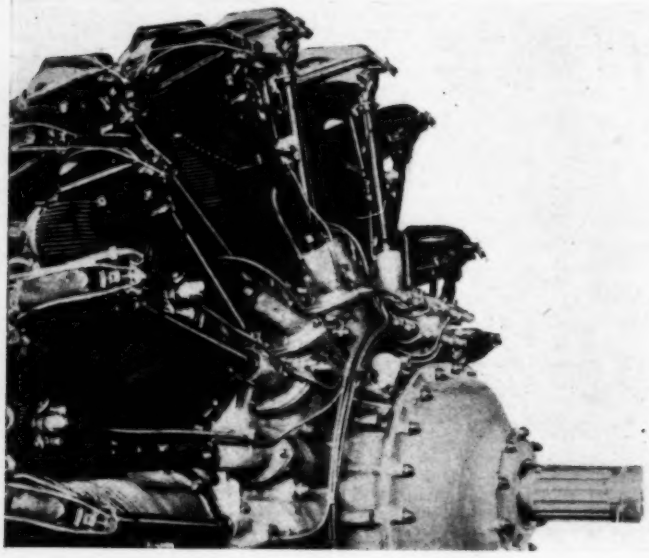


"Hispano-Suiza's . . . effective entry into the two-row air-cooled market." This is the type 14 AB fourteen-cylinder, developing 670 h.p.

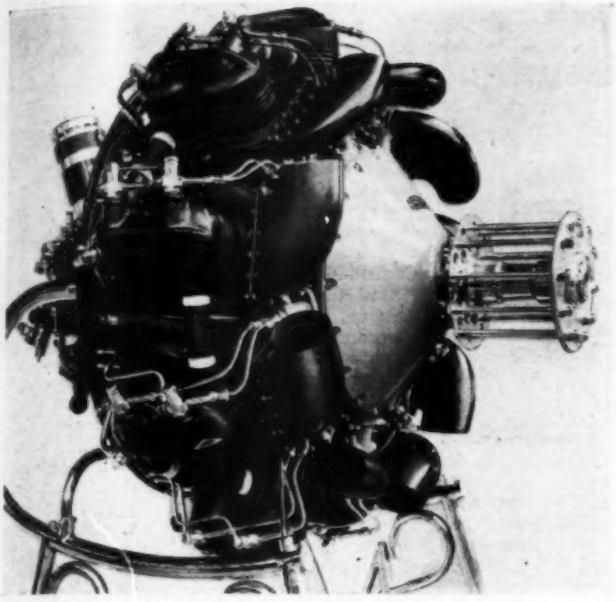
It is not enough to create a reliable, low-weight-per-horse-power, highly efficient engine. And to build an aeroplane, though it achieve starting speeds and manœuvrability in all planes, is of little avail unless the two in combination, allied with armament and instrumentation, equally developed in concert, constitute a homogeneous weapon which can find, follow, and hit the enemy more quickly and effectively than he can retaliate.

No longer, therefore, does the aero engine designer necessarily serve aviation and his firm best by producing engines of ever-increasing capacity and at the same time high efficiency. His classic formulæ of design which carried him to fame are being complicated by fresh variables; and equations, long since regarded as tidily solved, become disconcertingly indeterminate; the twin-engine policy forces him to reconsider the smaller engine powers from a new angle.

The bevy of twelve-cylinder inverted air-cooled motors, Salmson, Renault, Walter, and the liquid-cooled Farman, all of some 400 to 500 h.p., probably derive directly or indirectly from official inspiration engendered by the achievements of the air-cooled in-line pattern of modest horse power, exemplified in the De



The Hispano's already established competitor in the two-row class is the Gnome-Rhone, which provides an interesting contrast in appearance. This is the 18L, the eighteen cylinders of which develop 1,300 h.p.



The two-stroke liquid-cooled Salmson-Szydlowsky design, which has nine cylinders and eighteen pistons : 600 h.p. is claimed.

Havilland Comet and the winners of the Coupe Deutsch, pointing the way to speed by *finesse* rather than the expense of brute horse power and proportionately heavy fuel load. No doubt, too, a limitation in overall weight was imposed. But the aeroplane designer's predilection for Power, and, perhaps, a lingering disbelief of the reality of the low drag of the in-line type, are suggested in the fact that for the Hanriot 220 twin fighter two separate performances were quoted: 290 miles an hour with Renaults rated at 450 h.p., 310 miles an hour with the alternative new Gnome Rhone M.14 of some 600 h.p., packed, indeed, most ingeniously within a diameter of only 36 inches.

The Mureaux 190 single-seater fighter, however, must stand or fall by the in-line arrangement; its small frontal cooling duct and outlet gills, if proved adequate in practice, should certainly put as good a case as can be made. The Salmson 12 installed makes provision for a *canon* mounted on the flat top to the crank case, a component which looked hardly robust enough for its ordinary duties. Moreover, the carriage of the exhaust ports through the top of the head and not conventionally to the side, though neat, would seem to venture into additional cooling problems.

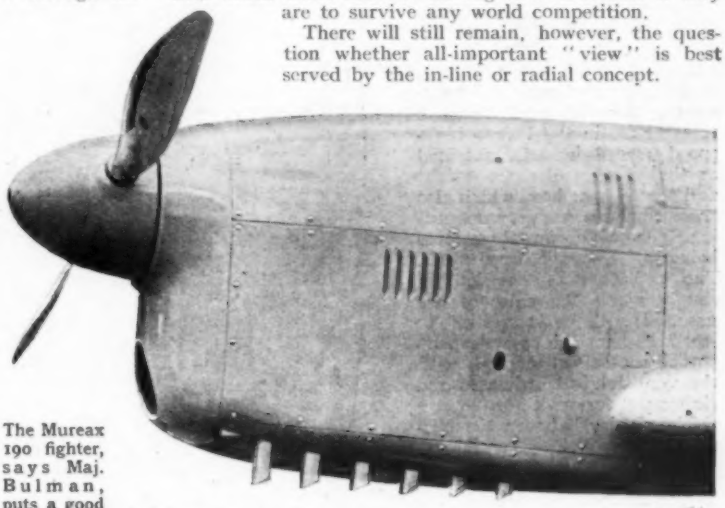
The Lorraine Company presented a novel variation in air-cooling form in the "flat" 12D engine, claiming 470 h.p. for 17 litres and 740 lb. weight. The "flatness" is relative only, however, from the fact that the reduction gear is an excrescence in front on the upper side, and the supercharger (in a horizontal plane) another behind on the under side, driven by shafting and gears from the front of the crankshaft. Special care has evidently been taken to provide the cylinder barrels with large fin area to a greater relative extent, indeed, than the heads, but one ventures to doubt the effectiveness of the distribution system through a somewhat crude-looking induction-pipe layout, notwithstanding that internal guide vanes are provided at the several right-angled corners. A Bronzavia automatic boost control is employed in conjunction with a Zenith carburetter. The engine is carried on a structure coming back to four points, having a vertical depth of only some 15in., making it clear, therefore, that this engine is not, as might at first be assumed, meant to be wholly enclosed within a wing (which would have to be thick, indeed, to contain it), but to be attached to the front spar of the machine, and, therefore, to project in front of the wing at least to the extent common in radial air-cooled or in-line installations.

Flying Tests

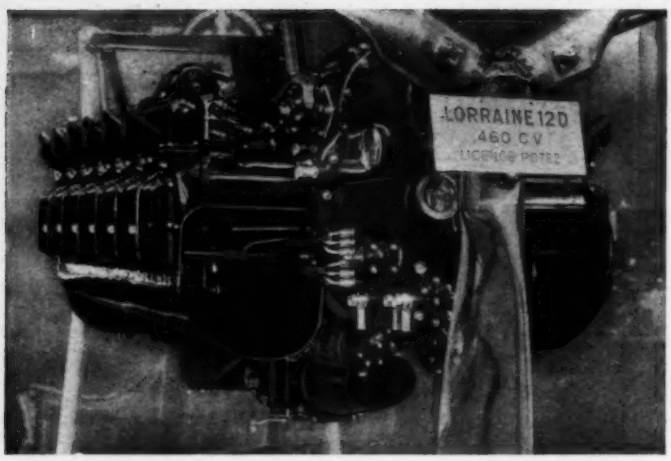
It is to be hoped that a pair of these engines will find themselves in that type of Potez selected to establish the aerodynamic values of the Hispano Suiza A.B.14 and the small Gnome-Rhone. One questions the general success of this layout, but it is gratifying to note that the originality and courage displayed, but not rewarded, in that earlier Potez flat engine shown in 1932, with Turbo exhaust supercharger, liquid-cooled heads, and air-cooled barrels, are still operating, serving (altruistically, it may be) as a challenge to other designers to re-examine and satisfy themselves that their own formulæ of design are correct and likely so to remain.

How far are designers ready to believe that the competently installed in-line air-cooled types are ready to their hand in overall low-drag efficiency, while the radial, with its frontal entry losses, capable in theory of drag reduction though it should be to a similarly low figure of drag, may still be separated in practice from that ideal by a lengthy period of research and development? And, inasmuch as "wetted surface" becomes increasingly the true criterion of drag with higher speeds, will the shorter length of radial form re-establish superiority? Is it safe for the engineer, committing his hand to a design for four or five years' subsequent unlimited effort, to rely on wind-tunnel results on a 100 ft./sec. scale, to establish the relative merits of the different systems when applied to the 400 m.p.h. aeroplane? The Hispano Suiza Company, at any rate, with typical long-sightedness and courage, is determined to go some way to get the answers in its own new 100 metres/sec. tunnel well advanced in erection in the street outside the main factory; serving also to mark the vision and forthrightness which must animate all engine constructors if they are to survive any world competition.

There will still remain, however, the question whether all-important "view" is best served by the in-line or radial concept.



The Mureax 190 fighter, says Maj. Bulman, puts a good case for the in-line engine (a 450 h.p. 12 cyl. Salmson, with canon).



"The Lorraine Company presented a novel variation in air-cooling form in the 'flat' 12D engine, claiming 470 h.p. for 17 litres and 740 lb. weight." (*Flight* photograph.)

It is particularly notable that in all the twin-engine French types, even of small units, engines are "handed," the airscrews rotating inwards to the fuselage. This arrangement had its origin, *on dit*, in complaints from the French *Marine*, some years ago, of the difficulty of controlling and taking off certain seaplanes; disasters with the larger bombers were also attributed, rightly or wrongly, to the same cause, and so the practice became established. That opposite rotation is undoubtedly "better" from the aspects of manœvrability, performance, and maintenance of height with one engine dead, cannot be doubted; but whether these latent advantages are of such magnitude as to justify the immense service and production complications of duplicating every mark of engine, the distribution of spares, and airscrews, is conjectural, but must clearly be determined in this country at no late date. If, as seems certain, the advantage is compelling in increasing proportion to the performance characteristics of the aeroplane, success awaits the individual first and effectively to produce a sound reduction gear system whereby the engine can readily be converted and used as left- or right-hand tractor without other complications.

Equal and Opposite

Alternatively, the Koolhoven formula of co-axial screws when, as must be, the appropriate V.P. airscrew mechanism has been evolved, may yet offer greater facilities.

The Koolhoven fighter repeats a recent British experiment. A liquid-cooled tractor engine (the 860 h.p. Lorraine Petrel) is placed behind the pilot, with an extension shaft, combined with twin airscrews co-axial and opposite rotating (as in the Italian high-speed record layout), attained at the expense of shaft weight and special gear box, which also accommodates a *canon* mounting, the airscrews themselves being, at this stage, fixed pitch. The radiators are cowled in snugly along the sides of the nose. It will be interesting to see whether the test results actually attained accord with the very detailed estimates and claims put forward.

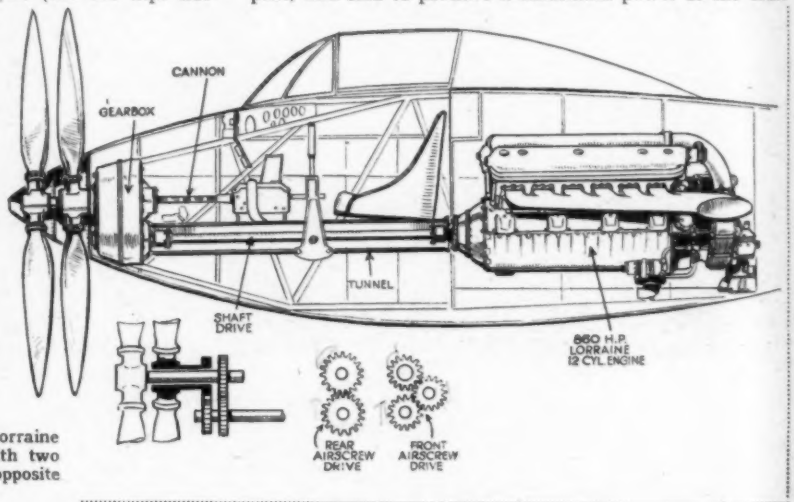
The rivalry between the Hispano Suiza and Gnome-Rhone organisations, which have in recent years increasingly shared and carried the burden of equipping the French military air services, is clearly becoming the more acute in the former's effective entry into the two-row air-cooled radial market, facilitated in no small degree, doubtless, by the close association existing between that firm and Curtiss-Wright of America. The Amiot "Mail Carrier," so exquisitely formed and finished, offered a striking contrast between the comparable engines of the two firms, the closer cowling entry of the Hispano indicating greater confidence in the inherent cooling effectiveness of the engine than that anticipated or established for the Gnome-Rhone.

The Hispano Suiza fourteen-cylinder two-row radials contain a three-part forged steel crank case, unribbed, and therefore claimed to be not appreciably heavier than the usual forged light alloy construction; the single-piece crankshaft, with its dual system floating balance weight devices to take care of lateral web disturbances as well as centrifugal periodicity, and the highly ingenious employment of the hinged and pinned master connecting-rod, adopted from his liquid-cooled design, are evidence of M. Birkigt's continuing freshness and skill. The cylinder heads, beautifully cast in the firm's own admirably controlled foundry, are dissimilar as between the front and back rows, owing to the adoption of a front and rear valve gear layout.

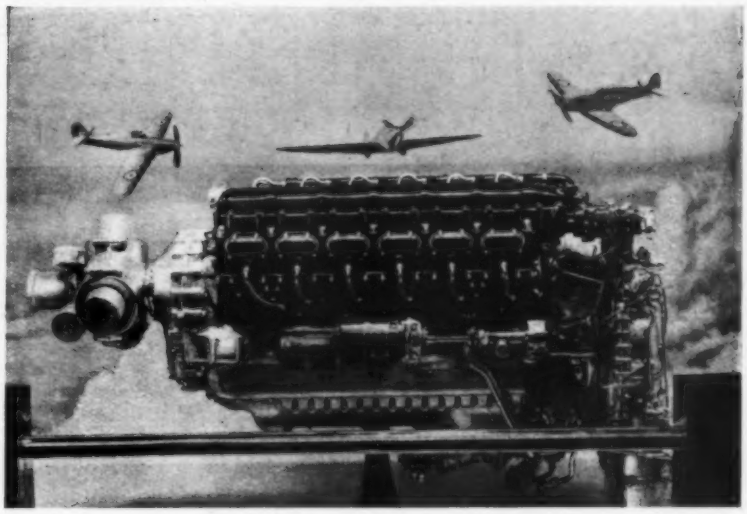
The smaller 14 A.B. type (of Bristol Mercury capacity aproximately), giving 650/680 h.p. at 3,500 metres, is probably more developed in flight experience than the 14 A.A. of 1,000/1,100 h.p. output.

The Gnome-Rhone advance on the K.14, in the shape of the N.14, so naïvely heralded some months ago in the French Press, admitting serious dissatisfaction with the former, is denoted by the material increase in total cylinder fin area, which now probably begins to approximate to contemporary Bristol, Curtiss-Wright, and Pratt and Whitney practice; but basically the design must still demand exceptional *finesse* in detail to withstand the effect of high power capacity output, having regard to the considerable extent to which the cylinder barrel is enclosed within the crank case.

The firm's more striking exhibit, however, was the new small 14 Mars of 19 litres, the first year of development past, and said to produce a maximum power of the order



The installation of the 860 h.p. Lorraine Petrel in the Koolhoven fighter, with two shaft-driven airscrews rotating in opposite directions.



Major Bulman speaks of "The Rolls-Royce Merlin, well and literally 'staged.'" Enlarged *Flight* photographs of machines fitted with this engine formed the "back-cloth."

of 650 h.p. at 4,000 metres and 3,000 r.p.m., the overall diameter being 96 centimetres, thanks to an exceptionally able detailing of the cylinder head; the rocker gear layout helped, as to the effective operation of the rear row, by the canting of the single front cam plates. The crankshaft, built up from two single-throw shafts nipped into the central web, is, like the Hispano-Suiza, without centre bearing, and, despite American experience and conviction, none the worse for it. The rear cover is integral with the volute case (which includes the Lord rubber mounting attachment), and should, therefore, provide happy conditions for the accessory drives, of which no fewer than four remain available after the needs of the usual encumbrances have been met. The general design is so compact that the oil sump has necessarily been made a separate component, provided, so to speak, as an accessory adaptable to the particular installation, the oil reaching it through conduits traversing one of the induction branches. Unlike most French engines (all of which maintain the gas-starter system, no doubt to the chagrin of the designers seeking higher power outputs), the Gnome-Rhône types include their own form of electric turning gear for starting.

In liquid-cooled installations little real advance in drag-cheating was observed. One exhibit, indeed, with its radiator built around the engine nose, was almost reminiscent of a combination of the "Brisfit" and the S.E.5 of blessed but far-distant memory. Doubtless, however, the Hispano-Suiza company is not so pre-occupied with air-cooling problems as to neglect, in seclusion, the subtleties of radiator disposal and control.

It is left to the U.S.S.R. fighter Z.K.B.19 low-wing monoplane, with an "M.100" engine, actually to display an under-wing, cowl-enclosed and retractable liquid and oil cooler system.

Incidentally, if six pressure-blown carburetters are indispensable on a 12-cylinder engine, their location within the vee, as in the massive U.S.S.R. A.M.-34 F.R.N. engine, is a complication likely to offset the continued enjoyment of 1,250 h.p., weight not disclosed.

Diesel Scarcity

On the compression-ignition engine there are signs of fresh activity. One newcomer is the twelve-cylinder liquid-cooled Coatalen, claiming 550 h.p. at 2,000 r.p.m., maintained by supercharging to 3,000 metres. Superficially it has a strong likeness to the classic Hispano-Suiza liquid-cooled layout (with the same bore and stroke as the X, in fact). The injection is mechanically controlled from a fuel supply at 10,000 lb./sq. in., provided by a pair of four-cyinder pumps of Mr. Coatalen's patent. A specific fuel consumption of 162 grms. (.352 lb.) is quoted—at an engine speed, however, of 1,400-1,600—rising to 175 grms. (.385 lb.) at full speed, an ambitious objective, indeed, more especially as the engine is supercharged. One's recollection of the detailed performance figures given at the British Aero Show, 1929, for a six-cylinder-in-line C.I. engine, of the same origin, but not subsequently to be seen, made one speculate the more as to the purpose of a large photograph on the stand in Paris, depicting this new version coupled to a dynamometer.

There is also the two-stroke eighteen-cylinder two-row liquid-cooled Salmson-Szydlowsky design, credited with 600 h.p., supercharged (a two-stroke) to 7,000 metres! thanks to the "Planiol" supercharging system (no details available), for which an adiabatic efficiency of 80 per cent. is declared. The injection system seemed externally akin to that of the Packard no longer *en series*.

The general multi-engine policy has probably led Continental designers to concentrate of late on the intermediate powers, but it is to be assumed that as in this country there are many activities well advanced but not displayed at the Salon.

The Rolls-Royce Merlin, well and literally "staged," and that more plentifully cylindered Bristol sleeve-valve engine which appeared in the Salon, without ceremony, overnight on November 19, created gratifying interest in many quarters; the more especially as it is a tradition observed by British aero engine constructors themselves not to seek official release of any new type, for exhibition, until many hours of convincing development and type test running have been satisfactorily completed. In sooth, it may be claimed for all British engines, once shown, "*J'y suis, j'y reste,*" but in ever-increasing potency.

H.P. per Litre

In comparing outputs, British and Continental, it would seem that on a capacity basis the latter are less advanced (though their specific weights may be lower) even if no adjustment is made between "C.V." and "H.P." One suspects, moreover, that in some foreign ratings credit is taken for power derived from intake ramming, whereas it is not in British practice (although in our type tests the running conditions may be made proportionately more arduous!).

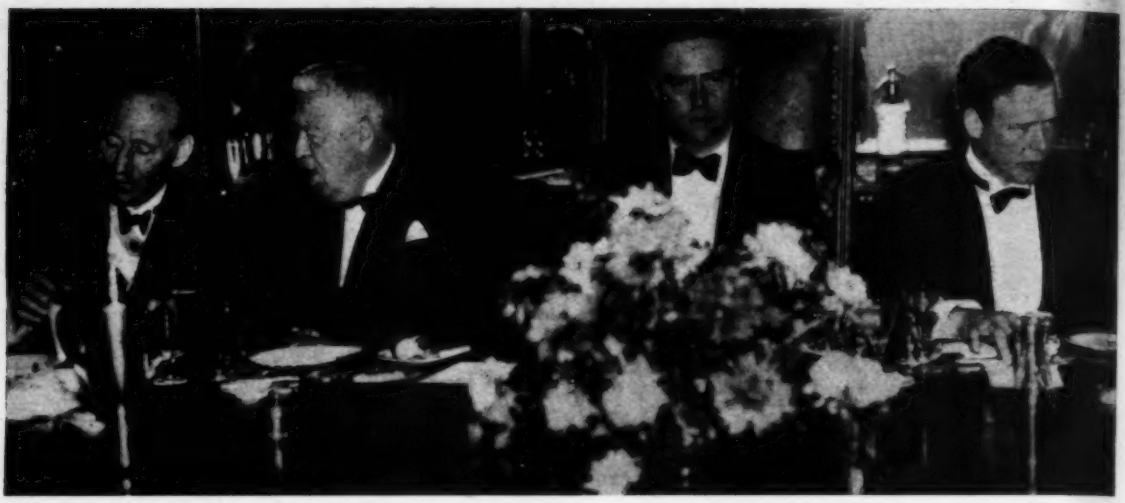
The disparity probably lies in the different standards of volumetric efficiency, and supercharger technique, in which this country took a start of some years; and time, in aero engine development especially, cannot be purchased.

Fuel quality is ostensibly the same—85 and 87 octane, but may well become a discriminating factor in the not distant future.

It was emphasised at the beginning that these impressions are personal only; and in no way do they pretend to survey the Salon even within the aero engine section. Much is left unmentioned . . . the fascinating detail of the Curtiss Wright designs . . . the Fokker fighter, visualised obviously as a "homogeneous weapon" . . . the universality of the V.P. airscrew-Hamilton Hispano, Gnome-Rhône, and Ratier. . . . I have endeavoured simply to portray the opinions and deductions which find themselves uppermost in my own mind, after a brief period of digestion.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS



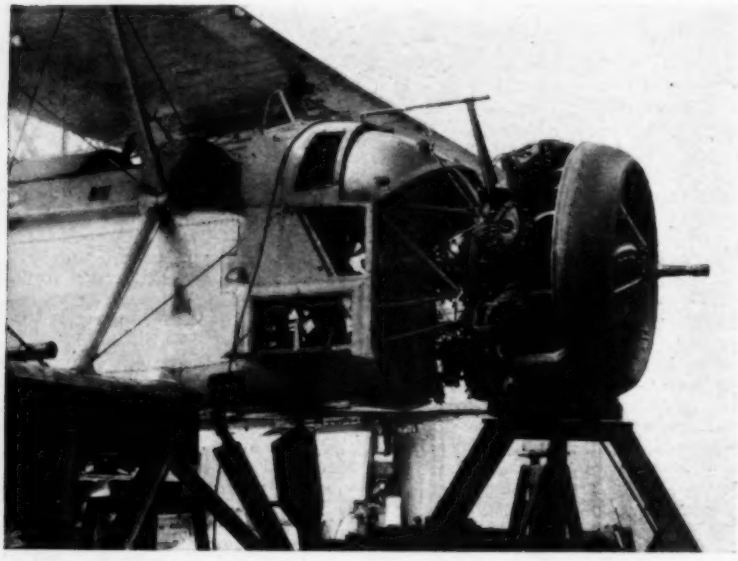
AT THE G.A.P.A.N. DINNER in honour of the Grand Master, Capt. the Hon. F. E. Guest, who is seen on the left. Next to him are Dr. Eckener, Capt. A. G. Lamplugh (Deputy Grand Master) and Col. Lindbergh..

THE Graf Zeppelin has returned to Friedrichshafen after her last voyage to South America for this season.

A Belgian Caudron Goeland monoplane, carrying four Belgian officers, having lost its way to Heston, due to fog, landed on Wormwood Scrubbs recreation ground on Monday night. It was to have cleared Customs at Heston before proceeding to Heath Row.

Five Vickers Supermarine Stranraer flying boats, with Pegasus engines, are to be built for the Royal Canadian Air Force at a cost of £156,000.

Two Fairey Féroce biplanes (the Féroce is the latest Belgian-built version of the Fantome) have been ordered by the U.S.S.R. Hispano *moteurs canons* are specified, giving a speed of 270 m.p.h.



FIRST IN SERVICE: This view shows to advantage the installation of a moderately supercharged Bristol Perseus sleeve-valve engine in a Vickers Vildebeest torpedo-bomber. This combination has been adopted by the Air Ministry and marks the entry of sleeve-valve engines into the Service

It is said that the first Bristol Hercules two-row sleeve-valve engine will be installed in a Fairey Battle medium bomber.

Six German military aircraft are on their way to be delivered to Bulgaria.

A Marcel Bloch all-metal, low-wing monoplane, which, powered with four Hispano-Suiza Series "X" engines, will cruise at about 190 m.p.h., has been ordered by Air Afrique.

Fraulein Elli Beinhorn, the German airwoman, took off from Berlin on Saturday for a flight to the Cape.

The Air Ministry announces that the Royal Aero Club has been officially informed that the altitude flight of Sqn. Ldr. F. R. D. Swain in a Bristol 138 monoplane with special Bristol Pegasus engine, has been homologated by the F.A.I. as the world height record in Class C (heavier-than-air craft). The official figures are 15,223 metres (49,944ft.). The record was made on September 28, 1936.

Twenty-five Years Ago

(From "Flight" of December 9, 1911.)

"General Roques, the Inspector-General of the Aeronautic Section of the French Army, in order that military aeroplanes may be distinguished from those of the ordinary type, has decided that they shall be called 'Avions,' a name invented by M. Clement Ader for his bat-like machine, which succeeded in making a hop at Satory on October 14, 1897."

Topics of the Day

Landing Fees

UNTIL last week I had always been a somewhat half-hearted opponent of the landing fee racket. Much as I disliked the idea of having to pay sums of money every time I put down at certain aerodromes, I felt that there was no real justification for objecting, since the aerodromes are private property—and very expensive property at that.

Even now I still admit that there can be no logical reason for complaint, but feel more certain that, by making such charges to private pilots, the aerodrome owners are cutting their own throats in small measure. People, it appears, just do not land unless they are forced to do so at aerodromes where such fees are charged, but go elsewhere to buy their fuel, oil and food. In the long run, I should say that the aerodrome owners are, when everything has been taken into account, the losers, unless, of course, they are determined to discourage the private pilot for the safety of transport aeroplanes.

If suitable two-way short-wave ground and D/F air radio equipment ever becomes a practical possibility for amateurs, it would be a *sine qua non* that only certain aerodromes should be used and that the private pilot should keep clear of all controlled areas in conditions of bad visibility. There would be no need to make a law about it, or to charge fabulously high landing fees—the forbidden aerodromes would simply not be equipped with the complementary ground installation.

A Concrete Case

NEEDLESS to say, a definite charge can, on occasion, be very unjust. A year or so ago I put down somewhere, felt that my approach had been a little ragged, and, without further ado, took off again to try to put up a better show. When I finally taxied up to the control office I found that I had been booked for two landings and was mulcted of the sum of five shillings. Rules, it is to be supposed, are rules, but in such circumstances they might be applied with less rigidity and more discretion.

On a recent day I landed elsewhere for urgent reasons, which involved a stay of less than three minutes. Out of the control office came an unsmiling man in uniform with a pretty receipt book, and out of my pocket came the necessary three-and-six, or whatever it was. Once he had pocketed the cash he took no further notice of me, and it would have been necessary to search the deserted buildings if I had needed fuel and oil.

The days have naturally passed when a migratory aeronaut was received with some interest and emotion, but, in return for a heavy landing fee, one rather expects that thing known as Service, which is so difficult to define. At even the poorest of flying clubs somebody will always come out to ask if he can do anything for you, and he would usually be very hurt if you offered to pay a sum for the temporary use of the club's aerodrome. Such is the difference between Big Business and enthusiasm Curiously enough, when it comes to running a club, enthusiasm has it every time, and Big Business is usually a failure. On one business house in London there is an equestrian statue depicting a well-developed man holding back an equally well-developed horse. A humorist of my acquaintance remarked that this was a representation of Big Business holding back industry.

Modern Heroes

A FEW years ago it was the custom of pilots to admire their forerunners—those who, with no knowledge of why or wherefore, flew those strange 1908-9 contraptions—and to deplore the softness of the present generation. That was before the appearance of some of the more patchwork-home-built ultra-lights.

Last week I watched a genuine maiden flight with one of these affairs. The owner did one "straight" and then made a clattering, only-just-air-borne circuit of the aerodrome at about fifty feet. Nobody knew whether the wings would stay on or whether the engine would keep going. They did, but it didn't. Just as he was passing behind the aerodrome buildings the motor either stopped altogether or lost the little reserve of power which kept the machine in the air. He force-landed across wind in a ploughed field—and without turning over. Presumably this enthusiast will now proceed to take the ancient engine to pieces once again, and in a week or two this uselessly amusing contrivance will be bravely shaving the tree-tops on full throttle. There must be no fun or terror equal to that experienced by the pilot flying his home-made aeroplane for the first time.

Safety First

IT is customary for our more experienced professional pilots—other than those engaged in transport and charter flying—to set off without paying much attention to the compass course, without drawing a line on the map and, sometimes, without even opening a map until the machine is on its way.

As an amateur who is very conscious of his inefficiencies, I always draw a line and nearly always work out a compass course with the help of one of the calculating machines designed for the purpose. I began to think, in fact, that I was unnecessarily fussy. Maybe, but before a recent inland tour I failed to check my calculations.

Every course was correct but the last one, and on that particular leg, by an evil chance, the weather was so thick that landmarks were virtually obliterated at 700 feet. If there had not been an unmistakably shaped reservoir lying within five miles of the aerodrome I should have carried on into thicker and thicker weather and in gathering darkness bang over the middle of London—probably ending up, to the horror of the control officers, at a QBI-ed Croydon.

INDICATOR.

Private Flying

FROM the CLUBS

Events and Activity at the Clubs and Schools

YEADON

FLYING times for November at the Yorkshire Aeroplane Club amounted to 49 hr. 35 min., and for the week ended December 4 4 hr. 50 min. were flown.

LONDON

The flying time for last week totalled 27 hr. 40 min. Mrs. D. Good has completed the tests for her "A" licence and the Earl of Moray has become a member.

REDHILL

Flying time for the week ended December 4 amounted to 39 hr. 10 min. The Club Puss Moth has returned from Paris and the Fox Moth has been to St. Inglevert and back. Mr. Blackaller has gone solo, and two new flying members have joined the Club.

HANWORTH

Typical winter weather with wind and rain kept flying hours down to thirty-five or so at the London Air Park Flying Club last week, and though this is a slight increase on the previous week's figures, it is still below the average. Mr. P. O. O'Reilly has passed his "A" licence tests, Mr. R. H. Henderson his "B," and Miss Neville has joined as a member. The Club Leopard has been returned from overhaul and is now available for charter work and joy flights.

ROYAL AIR FORCE

The Royal Air Force Flying Club's annual ball took place at Grosvenor House on Thursday, December 3. Amongst the members who were present were: Sir J. Maitland Salmond, F/O. W. A. Hammerton, Capt. R. W. Reeve, Capt. C. K. Robinson, Lt. O. M. Hills, Dr. A. G. Hewer, Capt. E. C. Winkley, Major A. Graves, F/O. L. Swan, F/O. W. Courtenay, Sqn. Ldr. J. I. Jones, P/O. C. C. Byar, Flt. Lt. R. B. Pakenham, F/O. F. Ellam, F/O. W. H. Wetton, F/O. R. Harben, F/O. A. J. Stuart, Capt. C. A. Pike, F/O. J. A. Greenland, F/O. K. W. Hole, and F/O. L. G. Sparrow.

BROOKLANDS

Fair weather has allowed the flying instruction to get into its swing again after the inclement weather of the past few weeks. Mr. Ewart has joined the Club and is putting in some final hours' flying before taking his "B" licence tests, while Lord Suirdale has completed his height test. Mr. Ashton is very busy coaching several "B" licence pilots for their Second Class Navigators' examinations, one of whom is Mr. Tony Morris, of Lympne.

Forthcoming activities at Brooklands include a Tramps' Party on Saturday, December 12, an Aero Club Christmas dinner on Sunday, December 20, and the works dinner to be held at the Ship Hotel, Weybridge, on Friday, December 18. The Club will close down on Thursday, December 24, for the Christmas holidays and will reopen on January 1.

MIDLAND

For the fortnight ended December 4 flying times amounted to 55 min. dual and 11 hr. 35 min. solo and passenger. Cross-country flights were carried out to Hanworth, Heston, Hatfield, Stanley Park, Barrow-in-Furness and Tollerton. Mr. D. Stuart-Clark has joined the Club as a flying member.

LIVERPOOL

Owing to adverse weather conditions during the past fortnight flying at the Liverpool and District Aero Club has been almost impossible. The Club will close for the Christmas holidays from Thursday, December 24, to Monday, December 28, inclusive, both Hooton Park aerodrome and Speke aerodrome being open again on the 29th.

DONCASTER

In spite of exceptionally bad weather a total of 13 hr. 55 min. was put in by Club machines during the month ended November 30. A Hobo Night, which was held at the clubhouse on Thursday, November 26, proved a great success. New members are Messrs. H. Bailey, S. King, R. Chester, Mr. and Mrs. G. Chester, and Mr. and Mrs. Robertson.

PORTSMOUTH

The third of a series of monthly dances was held in the clubhouse lounge on December 2, a very successful evening being enjoyed by a hundred members and their guests. The total flying times for the week ended December 4 amounted to 17 hr. 35 min., the weather conditions interfering a great deal with flying instruction. Mr. P. R. Hornidge has joined the Club and is undergoing instruction for his pilot's "B" licence.

SOUTHEND

Last week's weather was extremely bad and flying hours were affected accordingly. Two new members, Messrs. Seabrook and Archer, have joined the Club to take their "A" licences. Although last Sunday was rough and boisterous, a large number of members and their friends flew throughout the day. The Club are holding a supper concert and dance next Saturday, December 12, and as it is the first of its kind a large attendance is hoped for.

CINQUE PORTS

Bad weather has prevented much flying during the past week, but members took advantage of the few bright intervals and a good many hours were flown. Mr. Bridger has completed one of his "B" licence cross-country tests and will shortly be going to Hendon to undergo his final examinations. A new member is Mr. A. E. Power, who has come all the way from Ireland to take his "A" licence. The hangar dance recently held proved a great success, members admiring the transformation of a business-like aircraft hangar into a gaily bedecked winter garden.

ULTRA - LIGHT LUXURY: A totally enclosed and exhaust-heated cockpit has been designed for a special Kronfeld Drone recently produced to the order of a private owner, Mr. R. Dimock. It will be noticed that this machine also has a rubber-sprung split-axle undercarriage and the latest exhaust system. Mr. Dimock will not be likely to lose his hat again, (as once happened, with catastrophic results) while flying this machine. (*Flight* photograph.)

SOUTH COAST

In spite of continuous bad weather, over twenty hours' flying has been done and one member, Mr. Couchman, has gone solo. The Club will be closed on Christmas Eve and Christmas Day, but will be open as usual on Boxing Day.

C. A. S. C.

Although the wind was very high, members flew 10 hr. 40 min. last week-end. On Thursday, December 3, members had a very enjoyable evening at a dinner-dance as the guests of Mr. A. G. G. Marshall, of Marshalls' Flying School.

CAMBRIDGE

Marshalls' Flying School put in 83 hr. 50 min. flying last week, and cross-country flights were made to Lympne and Southend. New members include Messrs. Oughton, Usher, Adair and Bairnsfather, while Miss Pooley, Messrs. Hignett, Blackburn and Calthrop have passed their "A" licence tests.

CROYDON

Advantage was taken of the improvement in the weather last week, and the Club's machines were in great demand, flying times for the week ended December 5 amounting to 37 hr. 5 min. Two new associate members, Mr. K. Wise and Mr. W. Morris, have been enrolled, and Mr. D. W. Jorge has made a cross-country flight for his "B" licence.

NORFOLK AND NORWICH

As was hoped, there was a large increase in the attendance at Mr. J. Cork's first-aid lecture last Tuesday week, and in view of the popularity of these lectures they will be held, when possible, at the same time every Tuesday. Last Friday the Club held its first supper-dance of the season at the Club. Mr. G. Clapham, chief instructor of the Liverpool and District Aero Club, paid a visit in a Leopard Moth during the week.

HESTON

THE Household Brigade Flying Club has purchased a D.H. Leopard Moth from Airwork; this machine was formerly the property of Mr. W. Lindsay-Everard, and the Club has handed over its Moth Major in part exchange. For some time past the Airwork and Brigade pupils have enjoyed reciprocal privileges on each other's aircraft, and members of the Club will henceforth receive their initial training exclusively on the Airwork Cadets. The Leopard, equipped with dual control, will be available for cross-country work, and for use by Airwork pupils when not required by the Brigade.

Explaining the Regulations

FOR the particular benefit of pilots who contemplate flying abroad, the Air Ministry is producing a series of handbooks dealing with the regulations affecting international air travel. No fewer than twenty-nine of these books will eventually be published to cover the various countries concerned.

The first book which, with another dealing with Austria, has just been issued, covers the general procedure to be followed in all cases.

Aeronca Maintenance

WHEN one glances at a maintenance booklet such as that recently issued by the Aeronautical Corporation of Great Britain for the Aeronca-J.A.P., one realises that an aeroplane is really a very simple affair. Though the points mentioned in the book *must* be attended to at regular intervals, these items are neither numerous nor particularly difficult to reach. At the end of the manual are a series of clear drawings and diagrams which illustrate the various maintenance points.

Art and the Aeroplane

IN the motor industry the emphasis or concealment of line by skilful two-colour paintwork is becoming an important part of the coachbuilder's art. But aeroplane manufacturers have been slow to realise the uses of the paintbrush in accentuating clean lines or in softening any ugly contours to which expediency may have driven the designer.

The cleverest artwork now in the Heston hangars is that of an American firm, whose products derive a certain amplitude of outline from the very spaciousness of their passenger accommodation. But the artist in line and curve has also been at work with the colour scheme. A diagonal two-colour device gives a feeling of taper to a squarish wing. A curved "V" from the nose fines down to a needle-point, and is echoed further along the fuselage, while the blunt radial engine is softened by clever treatment of the cowling. We have seen a private owner exercise the same sort of ingenuity by rounding off ugly square wing-tips with a touch of orange paint.

Weatherproof

PRESTWICK is proud of the fact that it has the most weather-free aerodrome in Scotland. This, of course, is privately owned by Scottish Aviation, Ltd., which is running a Reserve school, and it is claimed to be one of the few airports in those parts at which fog is practically unknown.

Since the start of operations last February a non-flying day has not been experienced. During last week, while most of the rest of Scotland was fog-bound, flying continued there without interruption, and at least one transport pilot, unable to get into Renfrew, has used this aerodrome recently.

Ten Trophies

THE annual dinner of the Herts and Essex Aero Club has, for some years, been notable for two features—the almost incredible mass of silverware presented to the club's star pilots and complete informality. This year the trophies numbered ten, apart from second and third place miniatures, and the speechmaking had, very sensibly, been cut down to the basic minimum.

Unfortunately, that most energetic supporter of club functions, Sir Francis Shelmerdine, was unable to be present, confined as he was to his bed with a severe cold, and the trophies were duly presented by Flt. Lt. Tommy Rose, who modestly alluded to himself as the "misdirector of civil aviation." This was his fourth H. and E. party, and it did not appear as if it was likely to be his last.

Capt. F. A. Mason, M.V.O., R.E. (Retd.), was in the chair, and he replied, adequately and humorously, to the only toast, other than the loyal toast, of the evening—that of "The Club," proposed by Mr. W. J. Groome. Between these two speakers the visitor obtained a very good idea of the club's popularity and vigour. As far as yearly hourage figure is concerned the Herts and Essex is third only to London and Brooklands, and in the last year this figure has already been increased by a thousand hours.

Handicapping New Zealand

DURING the past two years air line operation in New Zealand has come into its own, but there are people here and elsewhere who wonder why private and club flying is not more popular in a comparatively prosperous Dominion.

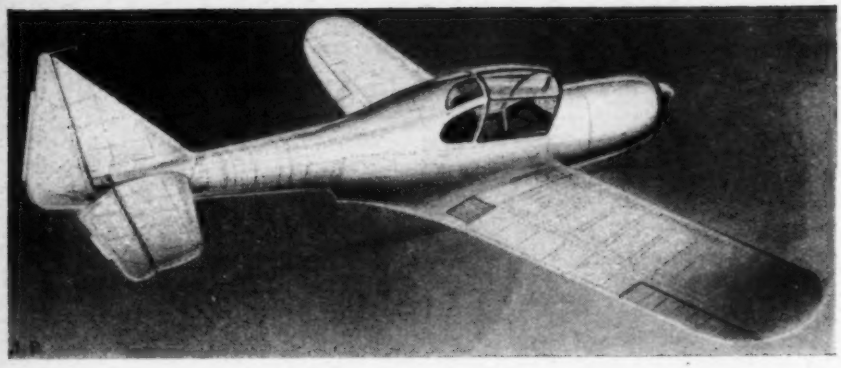
The flying fees are reasonable enough—comparing favourably with those at our own clubs—but the public there does not appear to be taking full advantage of the facilities which are available even now. A reader in New Zealand explains the lack of support in many ways. There is, for instance, a distinct lack of proper advertising—using the word in its widest sense—and the equipment used is somewhat out-of-date as a direct result of the obviously vicious circle. He praises the ground staff, who manage to keep these old D.H.60s in such good order. However, his most important point concerns the weather conditions and topography of the country.

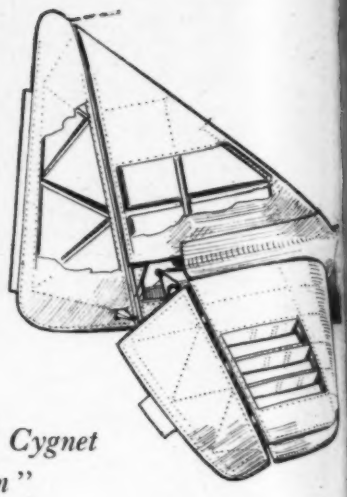
The most noticeable feature of the latter is the number of mountain ranges and high land. Except during the mild summer months a pilot can rarely make a long cross-country flight with safety and certainty, since such a trip usually necessitates flying at an altitude of anything from 2,000 to 7,000 or 8,000 ft. Clouds or mist often force him to turn back, as blind-flying instruments are little safeguard and only a very few machines have such instruments. Something like 90 per cent. of the fatal accidents in New Zealand have been caused by the combination of high ground and bad flying conditions.

Another set-back to aviation is the wind. On the average the wind's speed is from 15 to 45 m.p.h. during a whole nine months of the year, and the numerous hills and valleys to be found everywhere cause an almost incessant chain of fierce disturbances. In such conditions flying is not only uncomfortable, but is also dangerous from both structural and control standpoints.

Consternation has, incidentally, been caused by the recent announcement that the Government is lending only three machines (instead of the six originally proposed) for the use of clubs. Three machines are of little or no use among so many potential users, and a certain amount of ill-feeling is bound to be caused in the matter of their allocation. It is difficult to understand the niggardly policy of the Government, bearing in mind the fact that it has not supplied the clubs with any new machines for two years.

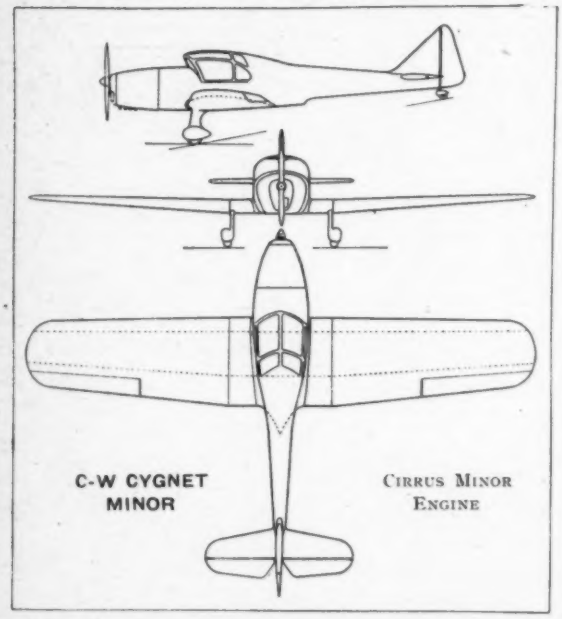
The clubs at Wellington and Canterbury are fortunate in having been able to order machines for their own use. The former's Miles Hawk Trainer arrived from England in October and has been assembled at Rongatai. Canterbury has a Miles Straight Special on order, and recently purchased a Monospar from Australia to replace the damaged Fox Moth.





A "MINOR" in METAL

Initial Effort by a New Concern : First Details of the C-W Cygnet Minor : Stressed-skin Construction : A Projected "Twin"



C-W CYGNET MINOR

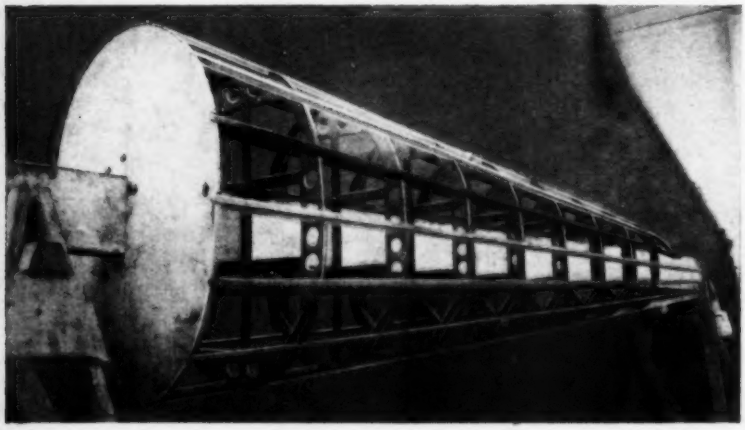
CIRRUS MINOR ENGINE

STRESSED-SKIN metal construction is no longer the expensive peculiarity of high-powered transports and military types; there is a definite trend, particularly in America, toward light "private-owner" models built on this system. We may count ourselves fortunate that a few enterprising souls have had the foresight to study the possibilities of stressed-metal covering as applied to the smaller types, and among these Messrs. C. R. Chronander and J. I. Waddington, partners in C-W Aircraft, whose works are in Montrose Avenue on the Slough Trading Estate, are deserving of special commendation for producing Great Britain's first completely metal-covered light-aeroplane.

As C-W Aircraft is a title not previously met with by readers, let us explain that policy is directed by Messrs. Chronander and Waddington, and that Mr. J. A. Heron is the chief engineer. These three are quite conversant with the most recent practice in stressed-skin construction, and hope to have the Cygnet flying in January. They are talking of delivery of production machines by Easter.

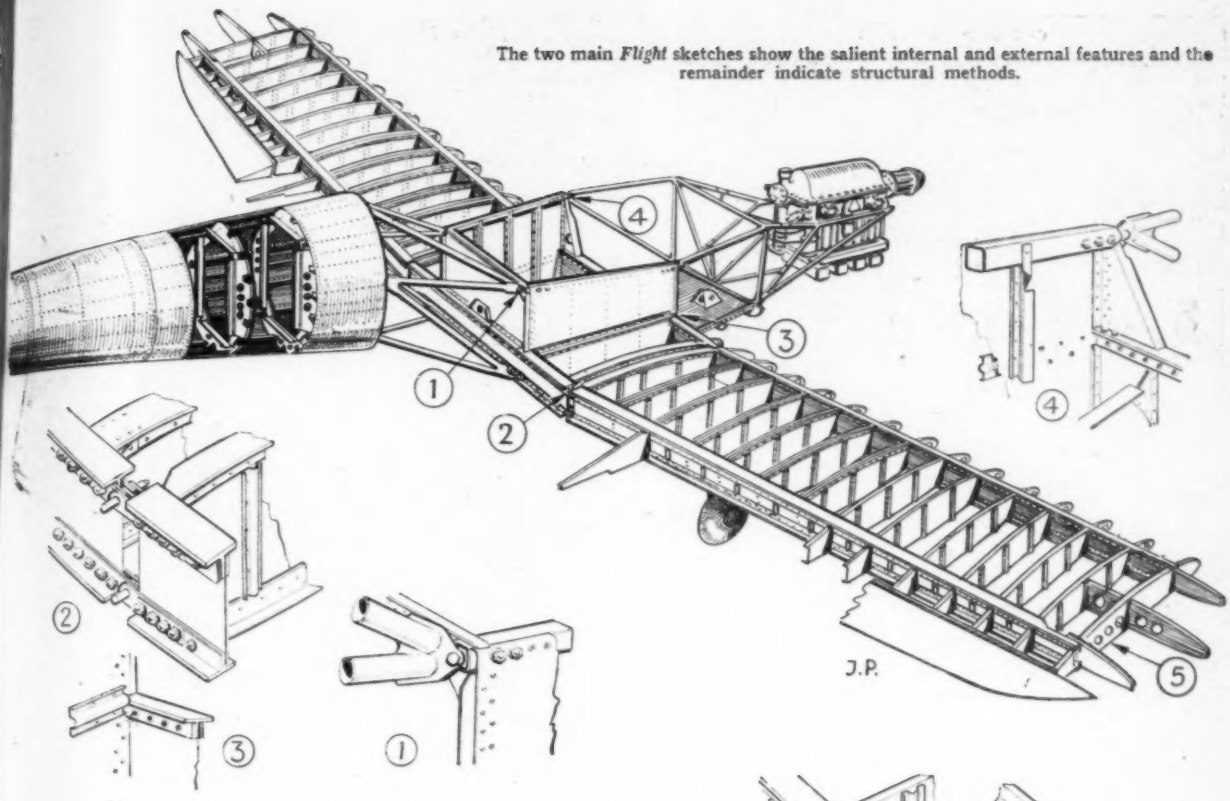
The Cygnet Minor ("Major" when any of the "Major" engines, such as Gipsy Major, Cirrus Major, Villiers-Hay Maya or Menasco Pirate are fitted) has been planned as a two-seater side-by-side machine for private operation or club training. A second passenger may be accommodated if the fuel load is reduced from 20 gallons to 8 gallons. The machine is fully aerobatic.

The low, cantilever wing has two main spars with booms of R.R. 56 alloy and light diaphragm ribs stiffened up with members of "bowler-hat" section. Torsional and shear loads are taken by the duralumin skin covering, but bending loads are taken by the spars. It is claimed that the wing, including ailerons, flaps and controls, weighs only 2 lb. per square foot. It is constructed in three sections: two outer panels and a centre section of seven-foot span and twenty-inch depth, which houses the fuel tanks. The comparative shallowness of this portion facilitates entry to the cabin. Attachment to the fuselage is effected by four bolts, the root-



It is likely that the rear fuselage portion of the Cygnet will be simplified in production. This view shows the component for the prototype.

The two main *Flight* sketches show the salient internal and external features and the remainder indicate structural methods.



end fittings being straps of D.T.D.54 85-ton steel; there are no machined fittings.

With the centre-section spars as a basis, the sides of the cabin portion are built up. Fore and aft of this section are welded structures, the front one, of course, accommodating the engine mounting, and the rear one serving as an attachment for the rear end of the fuselage, which is of unusually small diameter. It is likely that in production models the welded portions will give place to monocoque sections.

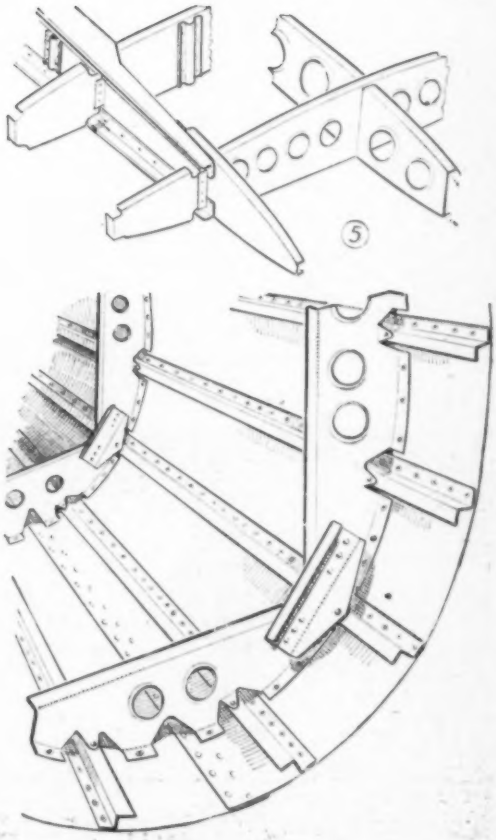
A "*Tadpole*" *Fuselage*

Stringers of Z section and built-up frames feature in the after portion of the fuselage, to the rear end of which the tail unit is attached by eight bolts. The small cross-section of the rear part of the fuselage is said to confer aerodynamic and structural benefits, and merges with the wings through the medium of fillets of unorthodox design, the shape of which is seen to advantage in the accompanying drawings. This means that both in plan form and side elevation there is a very pronounced "slimming off."

All control surfaces are metal-covered and of quite surprising lightness; the elevator weighs 3½ lb., and the rudder 4½ lb. The basic structure of the one-piece tailplane is similar to that of the wing.

The construction of the monocoque portions and the skinning of the wings has been simplified by the use of pop rivets and the employment of a special adaptation of a standard type of a riveting gun, which, it is claimed, enables the riveting to be done 20 per cent. faster than by normal methods. Countersinking features on the leading edges of wing and tailplane.

For riveting the skin on to members which cannot be drilled completely through a drill has been devised to make



The basic construction of the monocoque fuselage is founded on built-up frames and "Z" section stringers.

C-W CYGNET MINOR

Two-seater Cabin Monoplane 80/90 Cirrus Minor

DIMENSIONS	
Span	34 ft. 0 in.
Length	24 ft. 2½ in.
Height	6 ft. 0 in.
Wing area	165 sq. ft.
WEIGHTS	
Tare weight	850 lb.
Disposable load	600 lb.
Gross weight	1,450 lb.
PERFORMANCE	
Maximum speed	125 m.p.h.
Cruising speed	110 m.p.h.
Landing speed (with flaps)	35 m.p.h.
Take-off run (with flaps)	75 yd.
Landing run (with flaps and brakes)	60 yd.
Standard range	600 miles
Ceiling	20,000 ft.
Service ceiling	18,000 ft.

an "undercut" hole in the solid metal, enabling a pop rivet to be inserted and the head to be formed inside the undercut. A pantograph device has been developed (for the satisfaction of inspectors) which shows, four times actual size, the contours of the hole.

Flaps of high aspect ratio are incorporated having 24-gauge skin with triangulated ribs of light channel section. Operation is through a torque tube by a manual control with a spring servo device which automatically pulls down the flaps to 15 degrees for take-off. This spring bias also helps to keep the flaps closed in normal flight. The maximum depression is 60 degrees, permitting, it is estimated, a landing speed of 35 m.p.h.

Single-strut Undercarriage

A 6½in. travel is provided for in the Dowty single-strut undercarriage. The legs are carried in welded steel sockets attached to the front spars. The brakes are of the differentially operated Bendix type.

A single central column between the occupants and twin sets of rudder pedals permit dual control, although for specialised training work the manufacturers visualise two complete sets of controls.

Bias on fore-and-aft trim is effected by a spring in the elevator circuit, one end of which can be moved on either side of a fulcrum so that plus or minus or zero bias can be obtained at will by the operation of a tell-tale knob on the control column. The aileron and elevator controls travel in conduits in the centre of the cabin, lids being provided for inspection.

The two sets of rudder pedals are linked with a parallel motion, so that only the pedals are normally visible. One set can be removed in a few seconds, leaving the passenger's space free from excrescences.

Production Cygnets will be upholstered by Rumbold in any colour or style desired. Doubtless, Mr. Rumbold will find his task of soundproofing considerably simplified by the absence of flat panels. Rhodoid panels of quite unusually large proportions, coupled with the good location of the seats in relation to the wing, should benefit outlook.

Accommodation

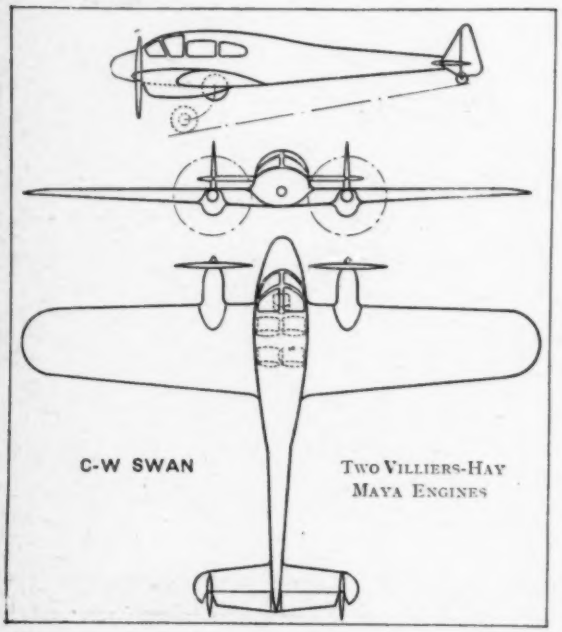
The seats are fully adjustable for height and leg-length. Smith's instruments are grouped on the centre and left of the facia board, where they are visible to pilot and passenger. To the left is a capacious locker and map tray. A patented design of exit, hinged about the front side members of the cabin enclosure, is incorporated.

The windscreen is of the forward-sloping variety, for which aerodynamic advantages and visual benefits in rain are claimed. It also facilitates entry and exit. Behind the seats is a large baggage space which can, as already mentioned, be used for the carriage of a second passenger. A large step is inset into the trailing edge of the wing, being spring-loaded to reassume the contour of the surface when not in use. Smoking will be permitted in the 50 cubic-foot cabin, the ventilation of which is controllable.

The prototype Cygnet Minor is being fitted with the new Cirrus Minor of 80-90 h.p., but an alternative unit is the Pobjoy Niagara III. As already mentioned, any of the "Major" series of engines can be fitted, giving a considerable increase in performance with, presumably, a certain reduction in range. A Pobjoy will actually be installed in the prototype after tests with the Cirrus.

It is hoped to market the Cygnet Minor with Cirrus Minor engine at about £795.

In the light of experience gained during the construction of the Cygnet a small twin-engined monoplane known as the Swan has been planned. This model should prove suitable for feeder-line work or as a "luxury" private-owner's type. It is believed that, utilising a number of components (including the rear fuselage) of the Cygnet, this could be marketed at a very attractive price. The prototype has been designed round a pair of Villiers-Hay Mayas, but engines of a new model, manufactured by the same company and rated at about 170 h.p., will be alternatives, and would give a maximum speed of 180 m.p.h.



The general arrangement of the attractive C-W Swan, a projected twin-engined type.

British Bearings Abroad

AS an indication of the popularity of British components abroad, it is interesting to note that quite a number of Continental aircraft at the Paris Show were equipped with Timken roller bearings for various components. For example, they figured in the undercarriage construction of the Amiot 341, Bloch 130, Farman 224 and Potez 63, and were also to be found in the Lioré et Olivier. They were used, too, in the v.p. airscrews on certain Gnome engines, and in Renault and Hispano rocker gear.

A Library's Enterprise

IT is not always the case that public libraries are well stocked with aeronautical books, so it is all the more noteworthy that the Borough of Mitcham Public Library has been enterprising enough not only to accumulate an amazingly large collection of books on numerous aspects of aviation and aeronautical engineering, but has even issued a very complete catalogue of these works.

Though issued primarily for those to whom the library's books are normally available, a limited number of books is available for wider distribution, and anyone interested should write to the Borough Librarian, Mr. K. G. Hunt, for the list mentioned above.

A REEF in TIME

The Full Story of the Monospar Croydon's Australia Flight and of the Crew's Escape

By F. F. CROCOMBE

Mr. F. F. Crocombe, designer of the Monospar Croydon and author of this article, snapped at Waterloo on his return from the coral reef.

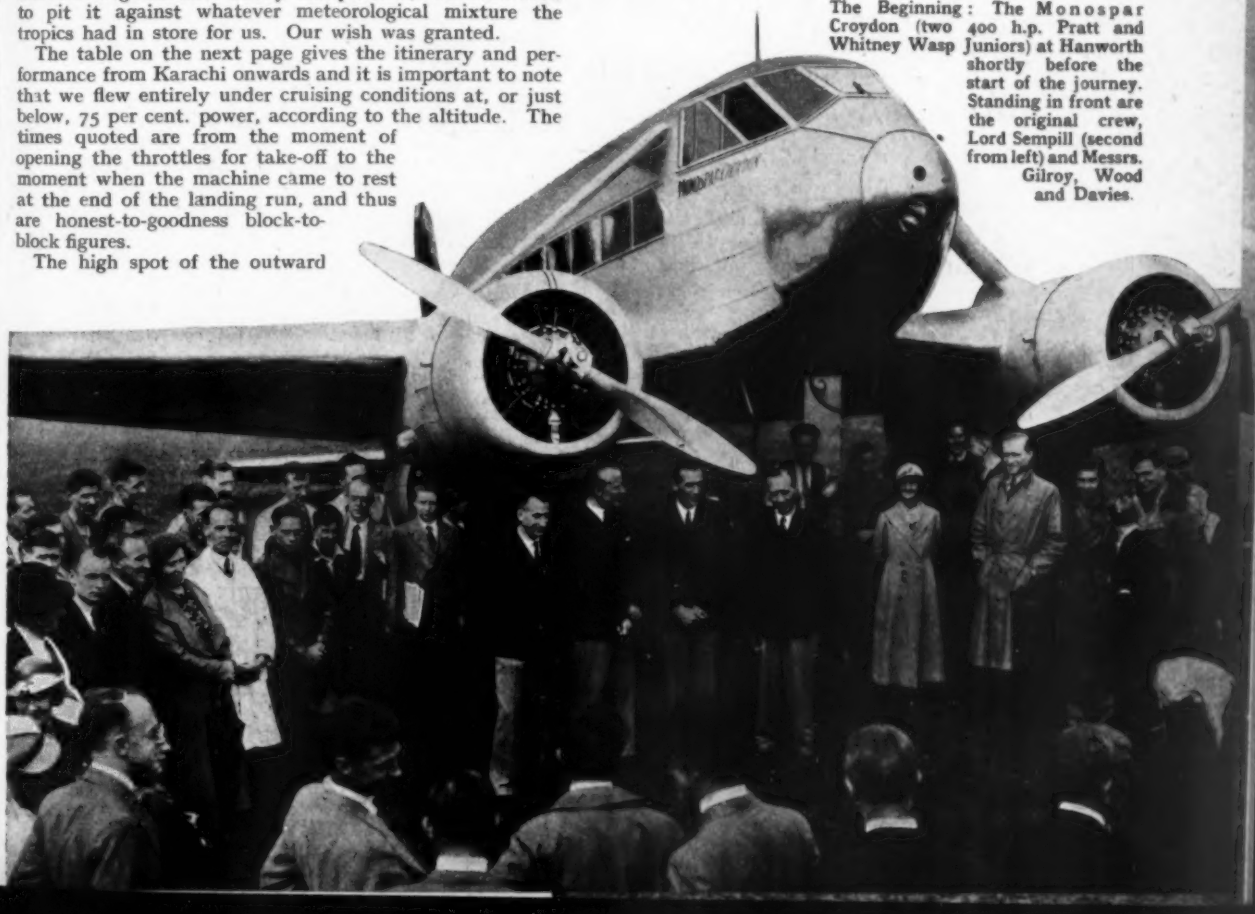
IT is a matter of past history, now, that the initial attempt of the Monospar Croydon to make a fast flight to Australia ended abruptly at Karachi. I was sent out from England to investigate the reason and found that a particularly bad landing at Bushire had caused the fastenings to pull out in one of the fuselage verticals at the rear end. A temporary repair had enabled the aircraft to proceed as far as Karachi, where there were means for doing the work properly. Here the Imperial Airways engineers extended to us all available facilities, but the work took far longer than anticipated, so that what would have taken days at home ran into weeks.

A series of test flights were made when the machine was again serviceable, and it was plain from the results that there was nothing to prevent the projected flight to Australia from being proceeded with. At the same time, the delay had been such that Lord Sempill could no longer spare the time to go on, so I joined the crew in his stead, with Mr. H. Wood as the sole pilot. It was our intention to proceed to Australia, where we had important demonstration work to do, by relatively easy stages, treating it as a development flight. This latter, of course, was the original project, it being very desirable to know how the machine reacted to varying weather conditions the world over, and under as wide a range of aerodrome conditions as possible, so that the air line operator might profit in production aircraft of the type. We knew that the machine was fast, but wished to show tangible evidence of performance over an air route rather than over a speed course; we knew it had a marked degree of directional stability and that its longitudinal stability was positive, but we wished to pit it against whatever meteorological mixture the tropics had in store for us. Our wish was granted.

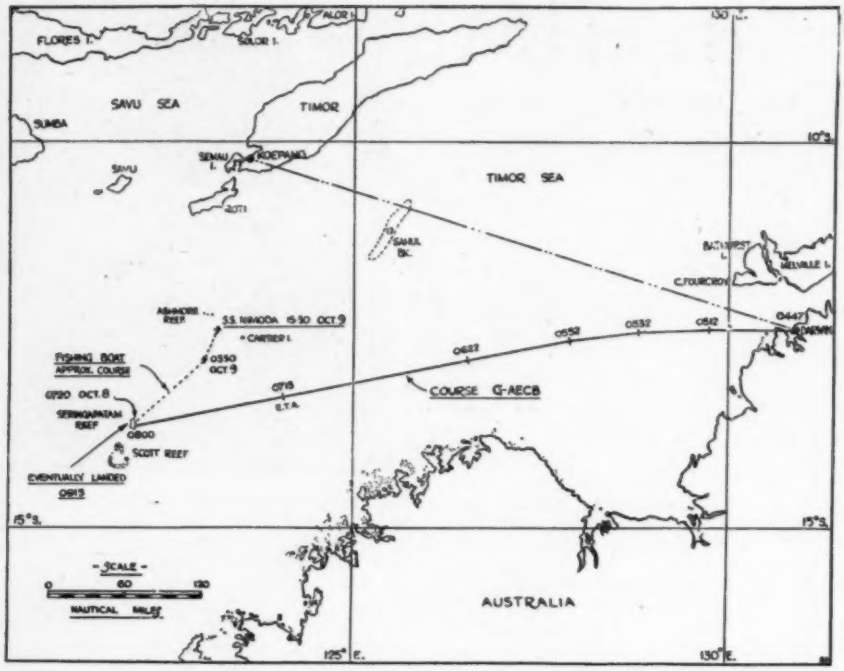
The table on the next page gives the itinerary and performance from Karachi onwards and it is important to note that we flew entirely under cruising conditions at, or just below, 75 per cent. power, according to the altitude. The times quoted are from the moment of opening the throttles for take-off to the moment when the machine came to rest at the end of the landing run, and thus are honest-to-goodness block-to-block figures.

The high spot of the outward journey was undoubtedly a monsoon storm over the Bay of Bengal. Our meteorological information from Calcutta had been reasonably promising and we were cheerfully going through small patches of rain cloud, well out over the Bay, when we went into a cloud front which suddenly appeared ahead, and struck what seemed to be a solid wall of water. There was no escape; we went in at 4,000 ft. and tried all altitudes in vain efforts to free ourselves. I had the grim satisfaction of seeing the "minute" hand of the Kollsman altimeter perform prodigies of ascent and descent which I could hardly believe possible. Of course, we were flying completely blind and there were numerous occasions when disturbances were so fast and furious that each of several fundamental instruments was recording something different, while one's own senses provided yet a different answer.

After hitting the roof several times, the engineer and



The Beginning: The Monospar Croydon (two 400 h.p. Pratt and Whitney Wasp Juniors) at Hanworth shortly before the start of the journey. Standing in front are the original crew, Lord Sempill (second from left) and Messrs. Gilroy, Wood and Davies.



This map, provided by the author, shows the whereabouts of the coral reef and the course of the Monospar, and should be studied in conjunction with the article.

W/T operator back in the cabin strapped themselves down by their seat belts, and, on the occasions I looked back from the cockpit, I saw two white faces mutely questioning how much longer it was going to last. We were no heroes, but just had to do the best we could in the conditions, and Wood's best was very good. He admitted later that it was the most hectic forty-five minutes he had ever known. Later we came out into sunny conditions above broken cloud, and achieved good time to Rangoon, having made the crossing direct in spite of the interlude. Anyway, we learnt that the cockpit and cabin were waterproof, that the wing tips were not advertising the severe bumps unduly, and that it was not difficult to keep dead on course in bad conditions. Naturally, the longitudinal and lateral disturbances took some looking after.

Radio in Bad Weather

Of course, W/T communication on long or medium wave breaks down completely under such conditions and the only hope is on short wave. There were numerous occasions during the flight when the electric condition of the atmosphere was such that communication was impossible, and I am strongly in favour of an all-wave installation. The disadvantage is that D/F work is preferably done on long wave so that one is left to one's own devices through a storm zone, but, at any rate, it is some comfort to know that some sort of communication is available, if only to give meteorological information.

Most of our cruising was done in the neighbourhood of 10,000 ft., a nice comfortable altitude in the tropics—sometimes quite cold in comparison with the oven-like conditions of the lower levels. In calm conditions we flew for hours feet-off with just an occasional touch on the rudder bias control to correct our course, and often hands off as well, provided the crew kept still and did not move about. Under such conditions long periods of flying were achieved with a minimum of effort on the part of the pilot, who was periodically supplied with black coffee and cigarettes to prevent him falling off to sleep from sheer boredom.

Later, when crossing Northern Australia, we had to be on the alert the whole time. In the first place it was extremely bumpy, and, secondly, navigation is very tricky between Newcastle Waters and Cloncurry, especially to us who had not seen the country before. I would say that there is a definite need for a wireless station equipped with D/F at Cloncurry.

Apart from our demonstration work in Australia, during the course of which we went from Melbourne to Sydney by air in 2½ hours (distance 480 miles), while I took 15 hours to return by train, we joined in the aerial pageant held by the Victoria Aero Club on September 26 and won the Herald Cup by achieving the fastest time.

It now remains for me to say something about our return journey, as far as it went, and in the course of which we seem to have attracted far more interest than if we had made an orthodox return and captured the Australia-England record—all thanks to the fact that it nearly ended in tragedy for ourselves as well as for the aircraft. I should like to make it clear that the record was only incidental. We were coming home and the machine was speedy enough to enable us to make really fast time if we were prepared, still at 75 per cent. power, to settle down to it. So we planned accordingly.

We were fortunate enough to take-off from Melbourne on October 6 under weather conditions which would ensure fine weather and light winds right up Australia. We were away from Essendon well before dawn and arrived at Darwin (2,435 miles on our route) just as the sun set; the average speed was 188.4 m.p.h. The previous morning our agents, Robert Bryce and Co., Pty., Ltd., had arranged with the Melbourne authorities that news of our coming should be telegraphed ahead. Coming into Darwin we attempted W/T contact when 370 miles away, but were

PROGRESS OF THE FLIGHT.

Stage.	Distance.	Flying Time.	Average Speed.	Remarks.
	Miles.	hr. min.	m.p.h.	
London–Karachi	4,449	26 36	—	—
Karachi–Jodhpur	385	2 9	179	—
Jodhpur–Allahabad ...	547	2 50	191.6	Light following winds.
Allahabad–Calcutta	465	2 30	186	—
Calcutta–Rangoon	696	3 44	186.5	Monsoon storm in Bay of Bengal.
Rangoon–Penang	853	5 4	170	—
Penang–Singapore	370	2 15	165	—
Singapore–Batavia	573	3 30	164	—
Batavia–Sourabaya	407	2 38	154.5	Moderate head winds.
Sourabaya–Koepang ...	798	4 38	172.3	
Koepang–Darwin	518	3 15	160	
Darwin–Daly Waters ...	328	2 16	145	Severe head winds.
Daly Waters–Brunette Downs	284	1 55	148	
Brunette Downs–Cloncurry...	405	2 35	156.5	Moderate head winds.
Cloncurry–Charleville ...	573	3 25	168	
Charleville–Melbourne ...	845	4 32	186.5	—
Overall :	12,496	76 52	163	—

RETURN JOURNEY.

	Miles.	hr. min.	m.p.h.	
Melbourne–Charleville ...	845	4 28	189.2	Light favourable winds, very bumpy over last 1,500 miles.
Charleville–Cloncurry ...	573	3 11	180.9	
Cloncurry–Darwin	1,017	5 16	193.4	
	2,435	12 55	188.4	Day's run and average.

unable to raise them until we were within 80 miles. On landing the operator met us and told us that he had only recently received the news of our impending arrival, when he immediately went on watch. Furthermore, this meant that Koepang W/T station could not be advised that we were crossing the Timor sea early in the morning, the operator being off duty. This lapse was later to be important to us. At the time we did not worry, as we knew that a Qantas Airways machine was leaving Ranbang shortly after dawn for Koepang, so that the operator would probably be on duty.

We had checked our compass as well as we were able on the way up to Darwin. On the outward journey a progressively increasing deviation had been observed from Singapore eastwards, rising to a maximum in the Timor Sea region. The compass had been correct at Melbourne and we had expected the error to increase as we approached Darwin. Contrary to expectations it did not, so that we had no justification for making a deviation allowance the following morning. However, our previous dealings with the Darwin W/T station indicated a standard of efficiency which we felt we could trust completely, so that, if the compass was affected on the Darwin-Koepang stretch, a back bearing would soon put us right.

A Start in Darkness

Accordingly we took off from Darwin before dawn at 0447 hrs., along a flare path, and proceeded out to sea into the darkness, Wood setting a compass course of 282°, allowing only 4° E. magnetic variation with 1° drift, the true bearing of Koepang being 287°. Twenty-five minutes later we received our first back bearing from Darwin of 288° true, indicating that we were 1° north of the proper course. Wood thereupon changed the compass course to 280° and flew on for twenty minutes, hoping thereby to come back on to the correct line, but, much to his surprise, a bearing of 288.5° true was received, indicating that we were even further north than before we changed course.

Suspecting the compass, since our drift was likely to be negligible in view of meteorological information received before the start, and wishing to make the direct crossing without waste of time, Wood now turned 5° south, the compass course changing to 275°. Twenty minutes later, just before dawn, we received a bearing of 289° true, so that we were apparently still north of the proper course. This seemed strange; Wood expressed doubt as to the bearings, and our W/T operator, Gilroy, asked Darwin for confirmation, to be told that the bearings given were "first class" (i.e., plus or minus 1° accuracy).

According to the compass course steered in relation to the bearings received, it appeared that the compass error was opposite to that which had been observed on the outward journey some time previously. With the W/T bearings so definite Wood came to the conclusion that, with the compass erratic, he must trust them implicitly. As a further check, and to try to get back on to the 287° course from the apparent northerly position, he made a final compass course change to 270°, and flew for another thirty minutes, only to receive a true bearing of 288°, still showing us to be 1° north. It was now 0622 hrs. and, since we had estimated that we should arrive at Koepang at 0715 hrs., Wood made no more adjustments to course as a 1° N. error could not now lead us far astray. At 0640 hrs. we tried for another bearing, but, in view of the distance, our signals were too weak for Darwin to comply.

We descended to 3,000 ft., the visibility being hindered by the fact that there were still some clouds about, and it was inclined to be misty with the rays of the sun shining directly into them. At 0800 hrs. we sighted a reef, circular in form, and apparently just below the surface of the sea. We took this as an indication that land might not be too far away and commenced to search for it, using the reef as a base. We discovered that there were three reefs spread over a fair distance in a northerly direction. In conversation with Wood as to his course, I formed the impression that the northerly course was the most likely to produce results, and we concentrated our search mainly in this direction. Gilroy was hard at it on the radio trying to contact somebody so as to find the location of the reefs, but with no result. Koepang seemed to be off duty, and we were out of touch with Darwin. The fuel supply was rapidly decreasing. We had started out with 235 galls., which should give us 5.22 hrs. duration at a consumption of 45 gall./hr., which was a fair figure in view of our previous consumption observations.

At the northernmost reef we observed a fishing boat and, coming low, we threw out a can containing a message asking for the direction of Koepang. There was no response. We were by now really worried, and it was 0900 hrs. We had just about one hour's fuel left, and at no time during the search from the reefs had we seen any sign of land. We did not know where Koepang was except that instinct indicated a northerly direction. This was hardly sufficient justification since, if land was more than 180 miles away, we should have to come down into the sea. On the other hand, the reef was below and a landing looked possible. Also, there was a boat which might be able to help us.

By 0915 hrs. we had definitely decided to land and made a trial approach after extending the chassis, just touching the wheels to test the surface; this was found to be firm, but covered with a thin coating of water. Wood then circled for the last time, Gilroy and Davies being sent aft, leaving the two of us forward. I put the wing flaps half down, and Wood flattened out to make a fine three-point landing, pulling up quickly on the rough surface, and managing to avoid scattered groups of boulders. The reef looked higher a little further on and, since we appeared to have landed undamaged, we started to taxi towards it, but it was rough going for the tail wheel. There was a crack aft, the tail dropped, and the elevator

The pilot, Mr. Wood, about to "abandon ship" on the coral reef.

control went soggy, so that was that. Wood had at first sight treasured the remote idea of getting fuel sent to the reef, and having a shot at taking off again. After looking at the surface close to, we surmised that this would probably have been fatal.

We scrambled out to look at the damage; the tail wheel had fallen through a thin crust of coral, fracturing the yoke casting, and the machine was about ten yards from the seaward west side of the reef. Here the reef fell away very steeply, and heavy breakers were pounding.

Our immediate task was to try to establish W/T communication with Koepang, so we ran out a trailing aerial, using the two oars of our collapsible boat to insulate it from the reef. Gilroy could hear both Koepang and Sourabaya W/T stations, but was unable to make contact with either of them, despite the fact that the radiation in the aerial was just over 2½ amps. In an endeavour to improve the transmission and recharge the aircraft battery, which was running down, we started up the port engine, which was equipped with a generator.

Out of Range

At 1115 hours we decided that we must be out of range of the W/T stations in the vicinity, and closed down, our position still unknown. The tide had by now begun to rise. It was obvious that our best policy was to try to get on board the fishing boat in the lagoon. Our subsequent adventures were not so much of aeronautical as of geographical importance.

When eventually transhipped to the S.S. *Nimoda* we made a careful layout of our course with the charts available. We found that the reef was 600 miles from Darwin and that our ground speed to it had been 187 m.p.h. We also found that it was 267 miles from Koepang and 300 miles from the nearest wireless station, Broome, on the Australian coast. Furthermore, the bearing of the reef relative to Darwin was 262°, and, neglecting drift, the compass error was deduced to have been approximately 15°. The bearings received from Darwin as against our probable bearings at the time stated are as follows:—

Time.	Actual Bearing.	W/T Bearing.
0512 hrs.	271°	288°
0532 hrs.	270°	288.5°
0552 hrs.	268°	289°
0622 hrs.	265°	288°

Wood may be criticised for attempting to correct so small a variation from the true course as 1° north, but with the compass 15° out we should still have been in trouble, the probability being that we should have passed the Islands of Roti and Savu—much too far out to sea to sight them.

Subsequently, Wood was in the awkward predicament of having received "first-class" wireless bearings, and having had his doubts as to the veracity of the third bearing negatived. He therefore had no justification for altering course to the north where, if he had gone wrong in consequence, the W/T station would have been the first to blame him for doubting the accuracy of their signals. If Darwin W/T had told us that there was the slightest doubt as to our position, we should have altered course, so as to remain in touch until precise information was forthcoming. There was, however, no hesitation on their part, and a "first-class" wireless bearing is usually considered to have a standard of integrity equivalent to that of a Bank of England note. It is a matter of great surprise that neither from the air before landing, nor on the reef, were we able to contact either the Koepang or Broome stations. Our equipment was efficient and in perfect order, and on the previous day we had maintained two-way communication over land up to a distance of 550 miles from Melbourne.

That we survived at all is, of course, an amazing piece of good fortune. With only average luck the machine would have just vanished, and a verdict of structural failure, or of engine trouble, would have been our epitaph. Even after a successful landing on the reef we would not have survived long if there had been no means of getting away from it; we might have lasted four days on our emergency rations, with the high tide level of the water over the reef rising every day. We actually landed on the reef at low water, during a period of neap tides. At high tide on that day the reef was covered to a depth of 3 ft. A week later this would have increased to 14 ft., which meant that the aircraft would then be covered, and the heavy ocean swell would soon break it up. By the time we were able to get information through to the outside world it was therefore too late, and the reef too inaccessible for any salvage work to be done.

With the machine relatively undamaged, due to Wood's magnificent work, this was tragic, and it was one of the hardest things I ever had to do to leave the aircraft stranded, through no fault of its own, standing up like a monument in the clear atmosphere until the sea eventually claimed it.

A committee of enquiry is being held in Australia to investigate the whole matter.

The End: ". . . one of the hardest things I ever had to do was to leave the aircraft stranded, through no fault of its own standing up like a monument in the clear atmosphere until the sea eventually claimed it."

MARTLESHAM ENTERTAINS

The Aircraft Industry Dined by Its Severest Critics

THAT Martlesham reports on new military aircraft types are based on their suitability for the ordinary pilots of R.A.F. Squadrons was recalled by Group Captain A. C. Maund, C.B.E., D.S.O., *p.s.a.*, at the annual "Contractors' Dinner" at Martlesham last Friday, at which members of the aircraft industry were entertained by the C.O. and officers of the Aeroplane and Armament Experimental Establishment. Group Captain Maund also pleaded for greater simplicity. "I hope," he said, "that you will make your machines as simple as possible, and with as few knobs—push and pull—as possible."

Group Captain Maund also called attention to a fact which is apt to be overlooked, i.e., that motor car firms have taken something like ten years to get into real quantity production, while the aircraft industry has had to improvise and get into production in a few months.

During the past year a large number of new military aircraft types had been tested at Martlesham, and of one or two of these they were very proud. When they were produced in quantity he thought most nations would hesitate to attack this country. On his return from the Paris Aero Show he felt that this country was in a satisfactory position compared with other nations, the only exception being, perhaps, the matter of frontal area. Other nations seemed to have paid more attention to this particular problem than we had.

Group Captain Maund concluded by saying that it used to be said of us that we were always preparing for the last war. In the next war armaments were going to be very important, and they now realised the importance of armaments. [Doubtless this is true of Martlesham, but we are no so certain that it is true of the Air Ministry and the arms manufacturers.—ED.]

Impartiality

Mr. F. S. Spriggs, managing director of the Hawker-Siddeley and subsidiary companies, said he was speaking on behalf of that august body of guests known in Air Ministry parlance as "The airframe designing and construction units of the aircraft section of the aeronautical industry." It was, he said, many years since he had visited Martlesham, and he was again impressed with the atmosphere of decorum and efficiency. He thought it possible that during the last twenty years speakers had threatened, cajoled, abused, criticised, and even praised Martlesham, but none had ever doubted the sincerity and honesty of its efforts. The expansion programme had possibly led to a feeling that with the decline of competitive effort the value of Martlesham as an arbitrator was correspondingly less. No greater fallacy could exist. Martlesham was the unbiased tribunal, safeguarding R.A.F. equipment and giving confidence to the industry, regarded abroad as approaching perfection. It stood alone.

In more serious vein, Mr. Spriggs said that owing to circumstances the aircraft industry had to make up leeway, in quantity but not in quality. The magnitude of the task was realised, and he was sure that success would crown their combined efforts. He did not share the belief that the British aircraft industry lagged behind foreign competitors in technical progress. On the contrary, the marked anxiety of potential foreign purchasers to acquire the latest British types showed that they at least appreciated our merits. We had something to learn from the other fellow, but he had never found the British aircraft industry backward in that respect. It is to be feared that in the general atmosphere of the dinner most of those present missed completely a very neat little quip by Mr. Spriggs, who said that it might be true, as some critics had said, that the merit of British aircraft products had only been attained by climbing the ladder of success "wrong by wrong."

Major G. P. Bulman, of the Air Ministry (who, incidentally, is the author of an unusually interesting article in this issue of *Flight*), in one of his usual witty speeches, got in many sly digs, which, however, must be regarded as a discussion of "family affairs" and not intended for, nor for that matter of particular interest to, the outside world, much as they were appreciated by the Martlesham company. His statement that aero engines had progressed markedly during the past year, and some very gratifying type tests having been completed successfully, deserves to go on record. Major Bulman awarded a large portion of the credit to the help given by the engine sub-committee of the Society of British Aircraft Constructors. There can be few who will not agree whole-heartedly with Major Bulman when he said that the R.A.F. could not appreciate too greatly what the aero engine people had done for them. [One might well extend the same remark to the aircraft people, although Major Bulman did not do so.—ED.]

Armament

Mr. Frazer Nash spoke quite briefly as representing the armament section of the industry. He sympathised with Group Captain Maund in his desire for simplicity. Concerning his own share in the armament of modern British aircraft (the famous gun turret), he said it was very largely due to Martlesham and to Mr. Sydney Camm, Hawker's chief designer, that he had got going. Their help and encouragement had been invaluable.

After the dinner the rest of the evening, until the small hours of next morning, was spent in very interesting discussions between groups of Martlesham officers and members of the industry. The value of the exchange of views for which the annual Martlesham dinner affords such an excellent opportunity cannot well be over-rated.

During Saturday morning Mr. Handley Page won a real golf match from Mr. Spriggs, and the Hawker-Siddeley shares promptly reacted accordingly!

Just by way of showing that the relations of the aircraft industry and Martlesham are not those of a "mutual admiration society" one may quote the following story told at the dinner: One of our not-so-small single-seater fighters duly arrived at Martlesham for tests, and a sergeant was heard to exclaim, "What is this? A single-seater troop carrier?"

Forthcoming Events

December 10. R.Ae.S. Lecture*: "Civil Flying Boats," by Mr. A. Gouge.
December 15. R. Ae.S. Students' Section Joint Lecture with I.A.E. and I.P.T.: "Fuels for Aero Engines," by Mr. C. H. Barton. S.M.M.T., 83, Pall Mall, London, 7 p.m.
December 17. R.Ae.S. Lecture*: "Profile Drag," by Prof. Melville Jones.
December 17. R.Ae.S. (Coventry Branch) Lecture: "The Queer Side of Flying," by Capt. Laurence Pritchard. Armstrong Siddeley Canteen, 8.15 p.m.
December 18. London Aeroplane Club: Dinner and Dance, Park Lane Hotel, London.
December 18. Leicestershire Aero Club. Christmas Fancy-dress Dance, Clubhouse, 8.30 p.m.
1937
January 14. R.Ae.S. Lecture*: "Magnesium Alloys," by Dr. C. H. Desch.
January 28. R.Ae.S. Lecture*: "Plastic Materials," by Dr. N. A. de Bruyne.
February 3. Royal United Service Institution Lecture: "The Anti-Aircraft Defence of Great Britain," by Maj.-Gen. R. H. D. Thompson.
February 5. Cinque Ports Flying Club: Annual Dinner and Dance.
February 11. R.Ae.S. Lecture*: "The Automatic Pilot," by Mr. F. W. Meredith and Mr. P. A. Cooke.
February 17. Royal United Service Institution Lecture: "Air Force Co-operation in Policing the Empire," by Air Comdr. C. F. A. Portal.
February 18. R.Ae.S. Lecture*: "Compression Ignition Engines," by Mr. A. H. R. Fedden.
February 18. Civil Aviation Service Corps: Dance, First Avenue Hotel, London.
February 25. R.Ae.S. Lecture*: "Power Measurements in the Air," by Mr. N. S. Muir.
February 26. Brooklands and Associated Clubs: Dinner and Dance, May Fair Hotel, London.
February 26. Hampshire Aeroplane Club: Annual Dinner and Dance, South-western Hotel, Southampton.
March 11. R.Ae S Lecture*: "Airscrew Blade Vibration," by Major B. C. Carter.
April 8. R.Ae.S. Lecture*: "Control Problems," by Mr. A. G. Pugsley.
April 22. R.Ae.S. Lecture*: "American Engine Development," by Mr. G. J. Mead.
August 28 and 29. Cinque Ports Flying Club: International Rally, Lympne.

* All R.Ae.S. lectures take place at the Royal Society of Arts, 18, John St., London, W.C.2, at 6.30 p.m. Admission is by ticket obtainable through a member.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for publication in these columns.

THE PRIVATE OWNER'S IDEAL

(From the Duke of Richmond and Gordon.)

I HAVE been greatly interested in the recent correspondence in *Flight* concerning the "private owner's ideal" and the apparent lack of such a machine upon the present-day market.

Manufacturers have been held to blame for the failure of private ownership to increase proportionately with the number of licensed pilots.

Undoubtedly there is much in this contention, but the manufacturer deserves a little sympathy, for is he not the victim of two virile complexes?

The first complex is that of the designer whose absolute fetish is speed—sheer speed.

The second is that of the typical experienced pilot, who, having ceased to fly for pleasure, is, generally speaking, concerned only with the handling qualities of a machine as operated from a recognised aerodrome.

The impecunious and enthusiastic amateur, who may fly two or three times a month and like to spend his summer holiday touring in comfort and safety has been very largely overlooked.

Thus inclined myself, and unable to get what I desired "off the peg," I have achieved the building of one which in suiting me should indeed do likewise to many of your readers.

I was highly fortunate in finding an experienced pilot who, sharing my views, has been able to express them not only on paper but in practice.

You have already published pictures of my machine in its early stages [on p. 493, November 12, and p. 582, November 26—ED.], and as the testing period draws to its close we are becoming increasingly convinced that our prescription goes far towards claiming title to the "private user's ideal." It offers:—

(1) Safety with two very simple, reliable motors.
(2) Side-by-side seating, unobstructed view. Accommodation for 160lb. luggage or third person.
(3) Take-off exceptionally quick; steepish glide; slow landing; no flaps.
(4) Cruising 90 m.p.h.; fuel consumption 5 galls./hr.

London, W.1. RICHMOND AND GORDON.

TAPERED WINGS

IN self-defence I venture to draw your attention to what appears to be an error in last week's report of the discussion on Dr. Lachmann's recent R.Ae.S. paper on "Tapered Wings." This error has arisen, I think, due to loose terminology on the subject of elliptical plan-form aerofoils, as distinct from the related problem of elliptical lift distribution.

You report that Dr. Piercy "proceeded to 'debunk' the fetish of the elliptical plan-form"—which I had previously advocated in a suggested programme of tapered wing research. "This" (he said) "was a mathematical figment. The flow around a real physical wing could not possibly be like that assumed by the mathematician," etc. Now an elliptical *plan-form* is a geometrical property and certainly not a mathematical figment, so it is clear that the delightful process of "debunking" must refer to the basic concept of elliptical *span-load distribution*, as postulated by the mathematicians in the vortex theory. Actually, I think you will find that Dr. Piercy and I are on the same side of the fence, since I proposed a programme of pressure distribution research in order to extend the mathematical argument in accordance with three-dimensional flow around a real physical wing.

But just because the elliptical plan-form plays a major role on the mathematical chess-board, my suggestion was that the experimental programme ought logically to begin with the theoretically ideal form before attempting to investigate all the manifold varieties of straight tapers that are now appearing in full-scale practice. By so doing we provide designers with an aerodynamic yardstick at which to aim; we should eliminate some of the variables in the problem and also provide a definite check on the theoretical load distribution right throughout the working incidence range, for it cannot be denied that our present theory needs buttressing at the higher angles; it would provide reliable data for the structural designer as well as further insight into burbling phenomena.

Aerodynamically, I feel that trapezoidal plan-forms with high taper ratios between 4 and 5, such as Dr. Lachmann advocates in his paper, are every bit as bad as those rectangular planks of the past, hence it seems perfectly natural to me that we should explore the ideal elliptical form with coincident burbling across the span before getting lost in an ever-increasing forest of unrelated aerofoil data. Moreover, in view of our present very limited knowledge of air flow behaviour (or misbehaviour) over tapered wings, the almost total absence of experimental data on elliptical wings strikes me as a most astonishing example of scientific blindness. And this after some thirty years of Lanchester, plus a few million more of natural flight!

At any rate, sir, I trust I have lifted myself out of the bunker into which you so cheerfully debunked me.

Heston. STANLEY H. EVANS.

[A second reading of the notes seems to bear out Mr. Evans's contention that Dr. Piercy did refer to elliptical lift distribution and not to plan form, his actual expression being "elliptical wing," but his remarks dealing with lift distribution.—ED.]

THE NAVY AND THE AIR

HISTORY has always fascinated me, so much so that I spent some years compiling, from innumerable sources, a record of man's development from 10 B.C. to the present. My difficulty is that the present continues to become the past and there is no stopping it. One of the great outstanding features of the past is the magnificent efficiency of the British Navy and the foresight and skill shown by the sea-dogs of bygone days. To them this comical little island in the North Sea owes its dominion over one-quarter of the land, over one-quarter of the population of the world. To them it owes its safety, its victory, in the war that ended in 1918. "Me Luds," said old Jervis to the Peers when Napoleon and his all-conquering army lay at Boulogne awaiting their opportunity, "I don't say the French can't come. I only say they can't come by sea."

In the autumn of 1914 I stood on the coast near Hull with Sir W. Lawson, Commanding in North England, and a brigadier. They questioned me about the military situation, Lawson having told us he had just had an interview with Kitchener at the War Office, where he had been summoned by K. (of Chaos), certain the Germans would attempt a landing on the East coast. Did I feel safe? "Perfectly. I have a thousand men, none of whom has ever yet let off a rifle, strung out along fifteen miles of coast; but out there —." And I quoted as above. I didn't get the sack—then.

An upstart, unproved Government department now wants to deprive the Navy of the control of an arm that is essential to the safety on the water of its ships! It is absurd. What should be done is to transfer to the Navy, far flung around the world, the fighting machines and personnel of the Air Force. Our life depends upon the sea; and the spirit that has, for so long, given us command of that may be relied upon to win for us, if necessary, command also of the air.

The air Ministry has quite enough to do in controlling, in developing, civil aviation, and there is, there must be, some antagonism between civil and military interest and methods, when managed by the same department during times of peace. In America civil aviation is under the Department of Commerce and is vastly ahead of our much-subsidised efforts. Were the Air Ministry purely civil it might develop business ability.

North Walsham, Norfolk. A. J. RICHARDSON.

TREES

HAVING read the Hamble Commandant's letter in last week's issue of *Flight*, I feel I owe the Air Ministry an apology for having assumed that it was they who cut down or lopped the trees which formed a possible danger to people flying around Hamble. It would seem that masterly inactivity is still the ministerial policy regarding such matters. The trees were reported in several eminent newspapers to have been lowered in the interests of safety by the Air Ministry, but it seems that Air Service Training, Ltd., did it themselves with their little axe or axes.

Admirable, indeed, but it does not affect the fact that if trees are dangerous (if only to civil pilots and passengers), they should go, whoever owns them; and that around an airport like Croydon the airport authorities should have long ago acquired powers to remove dangerous obstructions—as, for example, the waterworks chimney just across Purley Way.

Croydon. A. VIATOR.

HERE and THERE

News of the Latest Developments in the Industry and Elsewhere

A G.A.P.A.N. Occasion

"THE general public may perhaps believe that aviation's primary purpose is that relating to war. Far greater attention, however, should be concentrated on the potentialities it offers for obtaining and maintaining contacts and therefore giving rise to better understanding between nations." Thus Dr. Eckener, speaking on Saturday at a private dinner of the Guild of Air Pilots and Navigators. The occasion was a presentation to the Master of the Guild, Capt. the Hon. F. E. Guest.

Dr. Eckener said he was proud to be made an honorary member of the guild, which had done so much for the development of civil and commercial aviation.

The Deputy Master, Capt. A. G. Lamplugh, presided, and made the presentation—a silver salver, with engraved autographs of about 100 subscribers.

Col. Lindbergh and Mrs. Mollison were among the guests.

Coventry Aero Engines and Components Ltd.

IT was announced last week that the directors of Coventry Aero Engines and Components, Ltd., acting with the approval of the Commercial and General Finance Trust, had decided not to proceed with allotment of shares in the former concern, which was preparing to manufacture the Lorraine engine in this country.

D. H. Reorganisation and Appointments

THE De Havilland Aircraft Co., Ltd., reports that the general increase in volume of business has made necessary a reorganisation in the management. Mr. Lee Murray has been appointed general manager, aircraft division, and has his offices at the Hatfield headquarters. Mr. L. H. Pomeroy has been appointed general manager, engine section, and Mr. J. J. Parkes general manager, airscrew division, both at Stag Lane. Mr. J. Vivian Holman will be general manager of the new airscrew factory at Bolton, Lancs, on its completion.

Aero Engines, Ltd., Progress

SIR MORRIS BONHAM-CARTER, chairman of Aero Engines, Ltd., Kingswood, Bristol, presided on Tuesday, December 1, at the first ordinary general meeting, held at the works. Sir Morris said that the year's working to June 30, 1936, had resulted in a loss of £11,851, but the first half of the period had been spent in reorganising and re-equipping the factory. Under their agreement, the company has selected the Hispano-Suiza engine for manufacture, but production has been delayed pending further developments in the engine and completion of official type test. The policy of the Government in restricting its orders for military aircraft to certain manufacturers was engaging the constant attention of the Board. The directors believed that the trend in military aircraft was towards the use of large-calibre guns installed in the aircraft structure, and that the higher-powered liquid-cooled Hispano-Suiza engines were the only proved engines designed for this purpose.

With regard to the smaller-powered aero engines, the first unit to be entirely designed by their engineers, the Sprite, had proved an immediate success, and some of the first production engines had already been delivered in this country and abroad. The new Monarch engine had been redesigned and was now under test.

Rolls-Royce Appointment

THE chairman and directors of Rolls-Royce, Ltd., have appointed Mr. Hugh K. M. Kindersley, managing director of Lazard Bros. and Co., Ltd., to fill the vacancy created on the board by the death of Lord Wargrave, P.C.

Mr. Hugh Kindersley, apart from his financial and commercial experience with Lazard Bros., holds a pilot's licence and has for some years been interested in the aircraft industry.

An Indian Post

THE Maharajah of Jaipur has recently laid out a private aerodrome and purchased an Airspeed Envoy, which was recently taken out by Mr. Leslie S. Hill, who is to teach the Maharajah to fly, and will be his private pilot. Mr. Hill is the youngest son of Mr. Wilfrid Hill, chairman and managing director of the County Chemical Co., Ltd., the well-known manufacturers of motor and other accessories.

Controls and the Peregrine

AN interesting additional point about the Miles Peregrine, described in last week's issue, is that "Teleflex" controls are used to operate the elevator tabs, rudder tab, throttle and mixture, and fuel cocks, and there is also a "Teleflex" flap indicator and undercarriage indicator.

These controls are made by M.R.C., Ltd., 9, Cavendish Square, London, W.1.

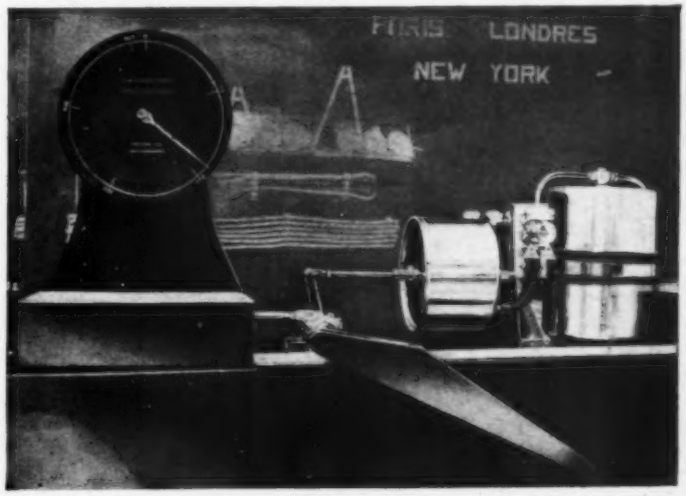
Aerofilms' New Home

AS the administrative and technical organisation of Aerofilms, Ltd., has outgrown the available accommodation at Bush House, London, and the works at Emerald Street, new premises are being built at Stonebridge Park, Wembley.

The building has been designed to meet the exacting needs of the somewhat specialised business of air survey and aerial photography. It is stated that it will be the only building of its kind in this country owned by a commercial company.

The buildings provide for general offices, show rooms, a drawing office, photographic laboratories, mapping room, studio and photographic library. The special features consist of a drawing office to accommodate fifteen or more draughtsmen and a mosaic room of over 600 square feet, where really large air survey mosaic maps can be constructed. There will be eight dark rooms; film drying rooms; chemical laboratory; and the usual stores, mess rooms, etc. The negative stores will accommodate 100,000 subjects, and the library some thousands of photographic prints.

Aerofilms hope to be in their new headquarters in the new year, and, for the convenience of clients, they will have a London office with their associated company, Hemming and Partners, at 22, Queen Anne's Gate, S.W.1.



A NEW CONTROL: Demonstration model, used for exhibition purposes, of the Simmonds-Theed Vacuum Control. The depression in the reservoir is obtained from the induction system of the engine of the aircraft and is used to operate a large piston in the cylinder shown in the centre. The actual outfit is very light and is to be tried out soon on one of the Short Empire boats. The model is here shown operating a wing flap.

ENGINEERS in the MAKING

Opportunities for Young Men in the Aeronautical Industry : The Progress Made by the College of Aeronautical Engineering

A VERY strong plea for the Diesel aero engine was put forward last week by Lt.-Col. J. T. C. Moore-Brabazon, who said he might be peculiar, but he had a very strong dislike of being burnt alive. Diesel engines were being used in increasing numbers in other forms of transport, and it seemed very extraordinary that in aviation, the form of transport which needed Diesel engines most, so little was being done.

The occasion of his remarks was the annual dinner and dance of the Colleges of Automobile and Aeronautical Engineering, held at Grosvenor House, London, and Lt.-Col. Moore-Brabazon was responding to the toast of the automobile industry, Mr. H. E. Wimperis having previously responded to the toast of the aircraft industry.

Captains of Industry

The Principal of the Colleges, Mr. C. H. Roberts, in proposing the toast of the automobile and aeronautical industries, reported that the Colleges had again this year made excellent progress. When the Aeronautical College was founded, one man prominent in aviation had asked whether there would be a demand for students of the Colleges when they were qualified. His answer to that had been that there was always a demand for a man who had a thorough knowledge of his job, provided that knowledge could be practically applied to the needs of the industry. To-day they were in the happy position of having a list of firms waiting for their students to qualify, and many past students were holding responsible positions and were in receipt of remuneration four or five years ahead of their age. They all knew that leaders of industry must be highly qualified, practically, technically and commercially, and in order to give their students foundations on which to build really successful careers and become one day, he hoped, captains of these industries they were including in their curriculum a number of commercial subjects, such as the fundamental principles of accountancy, banking, business administration, company law and commercial practice.

Mr. Roberts then announced that the Kathleen Drogheda Trophy for the best automobile student this year had been awarded to Mr. P. G. Christmas, while the Mollison Trophy for the best aeronautical student had been awarded to Mr. D. R. H. Dickinson.

Intriguing Problems

Mr. H. E. Wimperis, President of the Royal Aeronautical Society and Director of Scientific Research at the Air Ministry, said in a very excellent speech that, as he was down to respond first to the toasts of the automobile and aeronautical industries, he could please himself which of the two he would choose, and he selected the aeronautical industry. Lt.-Col. Moore-Brabazon would speak next, and would have to do the best he could with the bits and pieces left by Mr. Wimperis.

Mr. Wimperis said the young men at the College of Aeronautical Engineering ought to regard themselves very lucky in having been born in a wonderful epoch. The industry was busy and young men with technical qualifications were very much wanted. He knew from personal experience how difficult it was to get these men, and in aeronautical research they had to set very high standards. The problems of flying were extremely intriguing and no one might say whither the study of aeronautics might lead. He was not going so far as to say the lives of these young men were filled with unmixed joy. For example, there were such things as examinations, and in connection with examinations he pointed out the difficulties of suitably framing the questions and problems, quoting the example of the question "What is the advantage of using a long handle on a pump?" to which one student replied that when the handle was long you could get someone else to help to pump!

Mr. Wimperis told an amusing story of two Yorkshiremen, one of whom was very quarrelsome and found himself with a lawsuit on his nands. He spoke to his friend about it and said he wished there was something he could do to influence the judge in giving a decision in his favour. He suggested that possibly a brace of pheasants might prove acceptable to the judge. To this the friend replied that if he really wished to lose his lawsuit there was no surer way of doing so than by trying to influence the judge in this manner. Some time later the two met again and the friend said: "I am glad you took my advice and did not send those pheasants to the judge." To this the man replied "I did send the pheasants, but I said they were sent by t'other blighter!"

Lt.-Col. J. T. C. Moore-Brabazon delivered one of the most amusing speeches heard for a long time. He began by saying that in Mr. Wimperis they had been listening to a supercharged archangel of aviation. He (Lt.-Col. Moore-Brabazon) would have to speak of things of the earth, earthy. The previous speaker had referred to the fascinating possibilities of flying, but he personally thought it was the dullest form of transport ever invented. Unless you had a fire or flew into a hill, or a wing fell off, flying was absolutely boring. You sat in the aeroplane with nothing to look at and the earth rolled by very slowly like a monochromatic map. Motoring, on the other hand, was the most delightful mode of travelling one could imagine.

Lt.-Col. Moore-Brabazon then concluded with his plea for the Diesel engine, and expressed the hope that Sir Francis Shelmerdine would see about it.

The Diesel

Lt.-Col. Sir Francis Shelmerdine, Director-General of Civil Aviation, recalled that the College of Automobile Engineering was formed eleven years ago, while the College of Aeronautical Engineering came later, in 1931. Mr. Wimperis had referred to the subject of examinations, and he was very glad that the College of Aeronautical Engineering was not one which crammed its students to enable them to pass examinations. The college gave a sound technical training and the students went out to jobs in the industry.

With reference to the Diesel engine and civil aviation, he was thoroughly in sympathy with Lt.-Col. Moore-Brabazon and he wanted all the support he could get in developing the Diesel. The previous speaker had alleged that flying was dull. He agreed that it could be and had recently spent three hours in the air coming home from Paris in a not very modern aeroplane. He had, however, the compensation of seeing the recent marvellous bonfire from the air (referring, of course, to the Crystal Palace).

Sir Francis concluded by pointing out that there never had been a time in the history of flying when they were so short of trained men. He understood the Principal of the Colleges was contemplating an expansion, but he was convinced that there was no intention of lowering the present high standard of tuition.

Lady Drogheda then presented the Kathleen Drogheda Trophy to Mr. Christmas, and Mrs. Mollison presented the Mollison Trophy to Mr. Dickinson.

Some Statistics

Some idea of the magnitude and quality of the training given by the colleges presided over Mr. Roberts may be formed from the fact that there are now 354 students under instruction, 276 at the engineering works at Chelsea and Fulham, 60 on aircraft and aerodrome work at Brooklands, and 18 obtaining final experience with co-operating companies in the aircraft industries. During the year ended September, 1936, 86 students completed their training, of which 44 were at the College of Aeronautical Engineering.

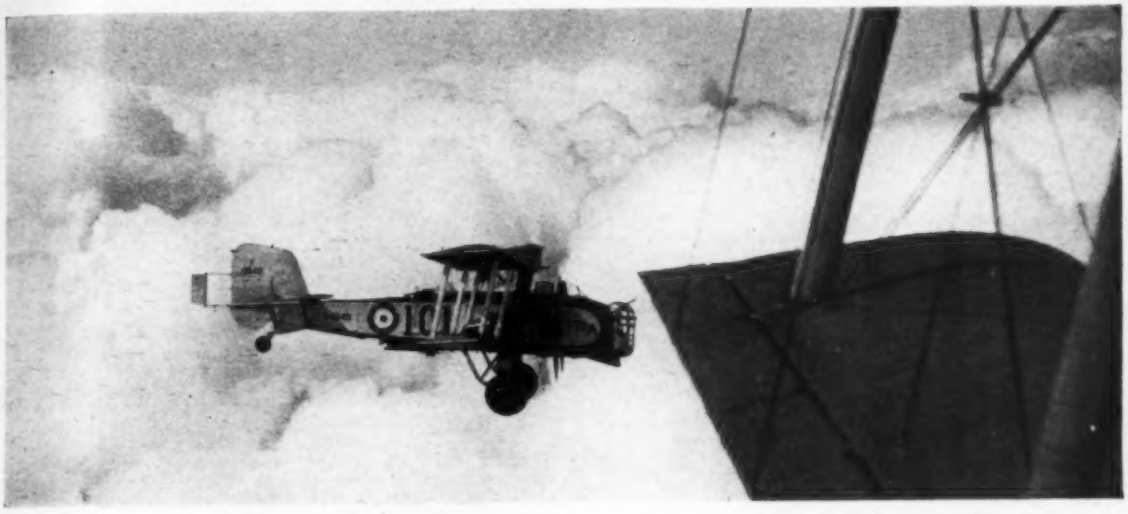
That the students did very well in the matter of outside examinations is shown by the fact that five first places were obtained in the examinations for the Royal Aeronautical Society, Mr. H. A. Craw securing two firsts in the Associate Fellowship grade, namely in I.C. engines and in aircraft materials; Mr. E. O. Draper gained two firsts in the Associate Membership grade, in the same subjects, and Mr. G. N. Luckie gained a first in applied mathematics.

Students of the college qualified for the following Ground Engineers' Licences: Category A, 47; C, 47; X, 39; B, 4; and D, 1.

Wakefield Scholarships for 1936, the gift of the President, Viscount Wakefield, were awarded to Messrs. L. S. Wigdorchik, J. R. Ireland, R. B. Wilkinson, and B. R. Hutchinson.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS — AIR MINISTRY ANNOUNCEMENTS



CLOUD-WALKING: An Overstrand of No. 101 (Bomber) Squadron inspects the silver lining.

LANDING GROUNDS IN BORNEO

The Royal Air Force, in conjunction with the local authorities, are making landing grounds in Sarawak. These will be used only as temporary bases when reconnaissance or similar operations are being carried out a long way from Singapore.

No. 5 FLYING TRAINING SCHOOL

The undermentioned officers and airman pilot have been awarded special assessments on completion of a course of flying training at No. 5 Flying Training School, Sealand:—

Special Distinction

P/Os R. E. Baxter and F. S. Stapleton.

Distinguished Pass

P/O. P. J. Sanders, A.P/O. D. Perry, and A./Sergt. Sutherland, W. A.

AIR FORCE LIST

The December issue of the *Air Force List* has now been published. It can be purchased (price 3s.) from H.M. Stationery Office at the following addresses: Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh; 2, York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square, Belfast; or through any bookseller.

CARDINGTON

A station headquarters will form at Cardington on December 15, on which date the station will be placed in the Training Command in No. 24 (Training) Group.

The station will comprise the following:—(i) Station Headquarters. (ii) No. 1 Balloon Training Unit. (iii) Royal Airship Works. (iv) A.I.D. Test Establishment. (v) Maintenance Unit.

The technical direction of the Royal Airship Works and A.I.D. Test Establishment will remain directly under the Air Ministry, and the internal administration of that part of the station solely occupied by those units will be exercised by the superintendent and inspector, respectively, under the general control of the officer commanding the station.

The administration of works services will be carried out by the Works and Buildings Directorate with effect from December 15, 1936.

No. 1 Balloon Training Unit will form on January 1, 1937.

THE COASTAL COMMAND

The R.A.F. Station, Abbotsinch, was transferred to the Coastal Command with effect from December 1, and will be placed in No.16 (Reconnaissance) Group with effect from January 1, 1937.

The R.A.F. Station, Boscombe Down, will be transferred from the Bomber Command to the Coastal Command (No. 16 (Reconnaissance) Group) with effect from February 1, 1937.

AIR COUNCIL LUNCHEON

The Rt. Hon. Viscount Swinton, Secretary of State for Air, presided last week at a luncheon given by the Air Council at the Savoy Hotel to the Air Attachés and other members of the Diplomatic Corps concerned with aeronautics.

The following accepted invitations to be present: Major L. F. E. Wouters (Belgium); Capt. N. Arnaud (Brazil); Dr. Wei-Cheng Chen (China); Major J. Kalla (Czechslovakia); Monsieur L. Tillitse (Denmark); Monsieur O. A. Grant (Estonia); Cdr. H. Grondahl (Finland); Captaine de Corvette V. A. M. Albertas (France); Major-General R. F. A. Wenninger (Germany); Flt. Lt. P. J. Yango (Greece); Lt.-Col. Z. de Algya-Pap (Hungary); Capt. A. Bayendor (Iran); Major Nuridin Mahmoud (Iraq); Col. A. Calderara (Italy); Lt.-Col. E. Tatsumi, Engineer-Capt. S. Matsutani, Capt. Risaburo Fujita, Lt. Mochifumi Nango (Japan); Monsieur P. Alberts (Latvia); Monsieur H. Rabinavicius (Lithuania); Lt. Cdr. A. de Booy (Netherlands); Monsieur H. C. Berg (Norway); Col. J. de Santos Lucas (Portugal); A. E. Cardew, Esq. (Siam); Monsieur W. A. de Bourg (Switzerland); Rear Admiral W. S. Anderson, Lt.-Col. R. E. Lee and Col. M. F. Scanlon (United States of America).

There were also present: The Rt. Hon. Sir Philip Sassoon (Under-Secretary of State for Air); Air Chief Marshal Sir Edward L. Ellington (Chief of the Air Staff); Air Marshal Sir Frederick W. Bowhill (Air Member for Personnel); Air Vice-Marshal W. R. Freeman (Air Member for Research and Development); Air Marshal Sir Cyril L. N. Newall (Air Member for Supply and Organisation); Col. Sir Donald Banks (Permanent Secretary of the Air Ministry); Lt.-Col. Sir Francis C. Shelmerdine (Director-General of Civil Aviation); Air Vice-Marshal C. L. Courtney, J. S. Ross, Esq., B. E. Holloway, Esq., H. E. Wimperis, Esq., Air Vice-Marshal A. W. Iredell, Air Comdre. J. S. T. Bradley, Air Comdre. W. S. Douglas, Air Comdre. R. H. Verney, Lt.-Col. H. W. S. Outram, C. J. Galpin, Esq., Wing Cdr. C. E. H. Medhurst, Sqn. Ldr. U. E. Ewart (Australian Liaison Officer), Sqn. Ldr. F. C. Higgins (Canadian Liaison Officer), Sqn. Ldr. A. R. Boyle, Flt. Lt. A. H. Pearce, and P. J. Oldfield, Esq.

R.A.F. BENEVOLENT FUND

The usual meeting of the Grants Committee was held at Iddesleigh House on Monday, November 30. Air Vice-Marshal C. A. H. Longcroft, C.B., C.M.G., D.S.O., A.F.C., was in the chair, and the other members present were: Mrs. L. M. K. Pratt Barlow, O.B.E., and Air Comdre. B. C. H. Drew, C.M.G., C.B.E. The Committee made grants to the amount of £312 5s. 7d. The next meeting was fixed for December 21.

FLYING ACCIDENT

The Air Ministry regrets to announce that A.P/O. Hugh O'Neill is missing and believed to have lost his life as the result of an accident at sea off Redcar, Yorkshire, on December 4, to an aircraft of No. 9 Flying Training School, Thornaby. A.P/O. O'Neill was the pilot and sole occupant of the aircraft.

AIR DEFENCE COMMUNICATIONS

If our system of air defence is to be successful in shooting down raiding bombers, the first essential is the utmost speed of communication from the Observer posts to the defence centre. In the early Air Exercises it was thought sufficient to use the post office telephone system, but in time of war there would be obvious advantages in the Fighter Command having its own system of communications. Such a system might, of course, work in with the post office system, and yet have some degree of independence.

Provision is now being made to provide air defence communications, and the strength of the 1st Anti-Aircraft Divisional Signals (Territorial Army) is to be doubled. This unit is responsible for communication by telephone, telegraph, and wireless between the ground sections of air defence, and special apparatus is used which needs special training. The work should prove very interesting to men with a taste for electrical work.

ROYAL AIR FORCE GAZETTE

London Gazette, November 1, 1936

General Duties Branch

The following Flight Lieutenants are promoted to the rank of Squadron Leader (December 1):—C. E. Horrex, A.F.C., D. H. Carey, R. W. G. Lywood, W. A. Opie, P. R. Barwell, O. B. Swain, T. B. Prickman, G. R. M. Clifford, P. Slocombe, D. L. Thomson, P. S. Blockey, H. M. Mellor, M.V.O., A. B. Woodhall, H. H. Brookes, J. W. Colquhoun, H. I. Cozens, J. H. Powle, H. W. Whittle, C. Guppy, C. Walter, P. Jones, J. G. Franks, G. A. R. Muschamp, C. H. Tighe, V. Harris, G. B. M. Rhind, F. F. W. Hall, J. A. T. Ryde, A.F.C., G. R. Beamish, the Earl of Bandon, M. D. Ommanney, R. A. B. Stone, J. R. Addams, A.F.C., C. R. Hancock, D.F.C., R. Costa, A. E. Paish, J. B. Barrett, A. W. B. McDonald, L. T. Pankhurst.

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—B. H. Jones (December 14, 1935); D. P. McKeown, J. H. R. Oldfield, C. Griffiths (November 1); J. R. MacLachlan (November 26).

F/O. J. G. G. Moore is promoted to the rank of Flight Lieutenant (April 1) (substituted for notification in the *Gazette* of July 28).

The following Pilot Officers are promoted to the rank of Flying Officer on the dates stated:—B. H. Boon (seniority January 1) (April 1); H. H. Peck (seniority January 9) (April 9); J. B. Black, E. A. Verdon-Roe (September 16); G. T. Gilbert (October 4); R. C. Meares, J. H. Kitson, G. I. Pawson, L. H. Pomeroy (October 16); R. A. Charles-Auckland (October 27); C. N. Fleming, R. E. Sharp, S. G. Pritchard, D. P. Frost (November 3).

Flt. Lt. F. H. A. Harrison (Captain, R.A.R.O.) is granted the acting rank of Squadron Leader (unpaid) (November 16); Lt.-Cdr. H. L. Hayes, R.N., Flying Officer, R.A.F., ceases to be attached to the R.A.F. with effect from October 28, on return to Naval duty, and is reattached to the R.A.F. as a Flying Officer with effect from November 16, and with seniority of March 14, 1928; F/O. B. C. Mallinson (Lt., Royal Artillery) relinquishes his temporary commission on return to Army duty (November 18).

The short service commissions of the following Acting Pilot Officers on probation are terminated on cessation of duty (November 22):—R. W. Stanway, W. R. D. Watkins-Lewis.

Equipment Branch

Pilot Officer on probation W. J. Stutchbury is confirmed in rank and promoted to the rank of Flying Officer (September 6).

The following Flight Lieutenants are promoted to the rank of Squadron Leader (December 1):—W. C. Farley, E. N. D. Worsley, J. E. Truss, M.C., F. W. Taylor, R. T. Rich, C. W. Rugg.

Accountant Branch

The following Flight Lieutenants are promoted to the rank of Squadron Leader (December 1):—F. C. Chalmers, J. Charles, C. G. Prior.

Medical Branch

The following Flight Lieutenants are granted permanent commissions in that rank (December 1):—F. W. P. Dixon, M.B.E., M.B., B.S., D.O. (Oxon); C. R. Palfreyman, M.B., B.S.

Flt. Lt. C. A. Lewis, M.R.C.S., L.R.C.P., relinquishes his short service commission (November 21).

Chaplains Branch

The Rev. F. G. B. Sutherland relinquishes his short service commission on completion of service (November 24).

Commissioned Engineer Officer

Flying Officer on probation F. C. Whenman is confirmed in rank (November 15).

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

Sergt. P. C. Ginn, Class E Reserve, is granted a commission as Pilot Officer on probation in Class A (September 8).

The following are granted commissions as Pilot Officers in Class AA (December 1):—W. G. Bruce, E. L. Hancock, R. A. Hopkinson, C. C. Law, D. J. T. Lusk, P. B. Newsom Davis, I. E. Pease, S. C. Rochford, A. M. Taylor.

F/O. E. G. L. Russell is transferred from Class A to Class C (September 12); F/O. J. P. Morkam, D.F.C., relinquishes his commission on completion of service and is permitted to retain his rank (October 23).

AUXILIARY AIR FORCE

General Duties Branch

No. 605 (COUNTY OF WARWICK) (BOMBER) SQUADRON.—O. Gibson is granted a commission as Pilot Officer (October 23); F/O. J. M. Abell resigns his commission (October 23).

AUXILIARY AIR FORCE RESERVE OF OFFICERS

General Duties Branch

J. M. Abell is granted a commission as Flying Officer in Class A (October 23).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Wing Commander.—H. S. Kerby, D.S.C., A.F.C., to Special Duty List; on appointment as Air Attaché, Shanghai, vice Group Capt. R. P. Willock, 16.11.36. C. H. Keith, to R.A.F. Station, Worthy Down; to command, vice Group Capt. A. A. B. Thomson, M.C., A.F.C., 25.11.36.

Squadron Leader.—P. Murgatroyd, to No. 21 (Bomber) Squadron, Lympne; to command, 23.11.36.

Flight Lieutenants.—R. J. Cooper, to School of Air Navigation, Manston, 23.11.36. G. A. L. Manton, to No. 607 (County of Durham) (Fighter) Squadron, Castletown, 13.11.36. A. H. Garland, to No. 56 (Fighter) Squadron, North Weald, 24.11.36. C. D. C. Boyce, to No. 166 (Bomber) Squadron, Boscombe Down, 1.11.36. R. G. E. Catt, to No. 78 (Bomber) Squadron, Boscombe Down, 1.11.36.

Flying Officers.—C. F. Newcombe, to Air Observers School, North Coates Fitties, 17.11.36. V. H. P. Lynham, to Air Armament School, Eastchurch, 23.11.36. A. C. G. Wimbush, to No. 2 (Army Co-operation) Squadron, Hawkinge, 23.11.36. R. E. S. Skelton, to No. 16 (Army Co-operation) Squadron, Old Sarum, 23.11.36. E. D. Joyce, to No. 26 (Army Co-operation) Squadron, Catterick, 23.11.36.

Pilot Officers.—F. E. Croce, to No. 2 Flying Training School, Digby, 26.11.36. S. E. F. Curry, H. A. R. Holford, D. Nolan-Neylan, E. A. Verdon-Roe, to No. 78 (Bomber) Squadron, Boscombe Down, 1.11.36. G. M. Lindeman, E. N. Rooms, R. B. Harvey, E. W. Martin, to No. 166 (Bomber) Squadron, Boscombe Down, 1.11.36.

Acting Pilot Officers.—V. R. Paterson, to No. 166 (Bomber) Squadron, Boscombe Down, 1.11.36. F. Aikens, F. C. Rivers, F. W. Thomas, to No. 78 (Bomber) Squadron, Boscombe Down, 1.11.36.

Equipment Branch

Flight Lieutenant.—A. W. Rule, to R.A.F. Station, Turnhouse, 25.11.36.

Flying Officer.—L. C. Dennis, to No. 3 Stores Depot, Milton, 21.11.36.

Accountant Branch

Flight Lieutenant.—A. E. Fairs, M.C., to R.A.F. Station, Catterick, 16.11.36.

Accountant Branch

Flying Officer.—E. Bowman, to No. 30 (Bomber) Squadron, Dhiban, Iraq, 5.11.36.

Commissioned Engineer Officer

Flying Officer.—E. L. Magrath, to R.A.F. Station, Hornchurch, 23.11.36.

Medical Branch

Squadron Leaders.—F. L. White, to Central Medical Establishment, London, 23.11.36. B. W. Cross, to Aircraft Depot, Hinaidi, Iraq, 7.11.36.

RECRUITS for the LIGHT BRIGADE

New Approaches to the "Ultra-light" Problem : "Pou" Influence on One Model

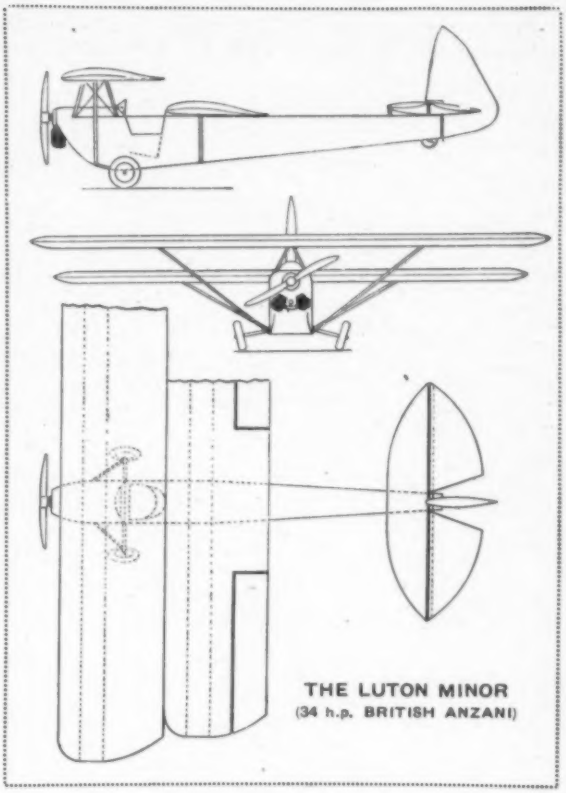
FROM time to time *Indicator* has bewailed in these pages the shortcomings of certain types of ultra-light aircraft. That some designers are making conscientious efforts toward their general improvement will be agreed after a study of the following notes on four new models shortly to be flown.

Produced, according to Luton Aircraft, Ltd., of Gerrards Cross, Bucks, to provide an essentially safe aeroplane which may take the place of the *Pou-du-Ciel*, the Luton Minor will eventually be available for amateur construction. Safety in flight has been the primary consideration in the design, but cheapness and simplicity have been kept very closely in view. The makers claim that the Minor is capable of cross-country flights, as opposed, presumably, to leisurely circuits of the aerodrome on a quiet summer day.

It is difficult to decide whether the Minor should be described as a biplane with unusually pronounced stagger or as a tandem-wing machine. The forward wing is supported above the fuselage by centre-section struts and is provided with one pair of lift struts, but the rear, or lower, wing is attached directly to the fuselage top, behind the pilot, being also supported by a single pair of outer struts.

Only the rear wing has ailerons, and it is claimed that, owing to the slot effect produced by the relative positions of the main planes, they remain effective up to, and beyond, the normal stalling attitude. A second advantage claimed for this peculiar wing arrangement is the elimination of the vicious stall and involuntary spin.

An extra-large box-spar features in each wing and the fuselage is plywood-covered from the nose to the rear wing support, aft of which it consists of a spruce, fabric-covered girder structure



THE LUTON MINOR
(34 h.p. BRITISH ANZANI)

The tail unit comprises a fixed tail plane, interconnected elevators and a balanced rudder.

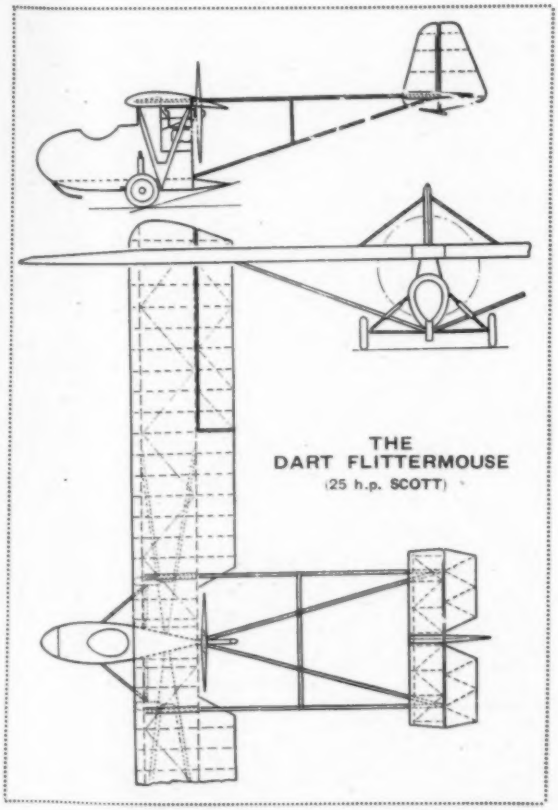
Of four-foot track, the simple undercarriage is said to incorporate a novel method of shock absorption; the tail skid, likewise, has a shock absorbing device.

On one side of the fuselage is a small hinged door giving access to the pilot's cockpit, to the rear of which is a locker for tools or luggage. An air speed indicator, cross level and small compass are fitted as standard equipment, a tachometer being £3 15s. extra on the provisional price of £225.

The exceptionally low landing speed of 22 m.p.h. has been obtained partly by the aid of the slot effect and partly by the light wing loading. With its low surface loading the Minor should not, of course, be left unattended in high winds.

The main data relative to the Minor are: Span (front wing) 22 ft., span (rear wing) 20 ft., wing area 180 sq. ft., top speed 75 m.p.h., cruising speed 70 m.p.h. and landing speed 22 m.p.h.

A 34 h.p. British Anzani engine is specified.



THE
DART FLITTERMOUSE
(25 h.p. SCOTT)

The Dart Flittermouse and Kitten

Dart Aircraft, Ltd., of 29, High Street North, Dunstable, Beds, already known to readers of *Flight* for their intriguing little Pup pusher monoplane, have constructed two more single-seater models.

One, christened the Flittermouse (a bat, of course), is a pusher design with a lighter wing loading than the Pup, the actual figures being 6.38 lb./sq. ft. and 3.9 lb./sq. ft. The first engine to be installed in the prototype Flittermouse will be a 25 h.p. Scott. Data are: Span 40 ft. 5 in., length 22 ft. 5 in., height 5 ft. 2 in., weight loaded 640 lb., maximum speed 64 m.p.h.

The second new Dart model is the Kitten, which is a low-wing single-seater intended for the private owner and for the solo

Such clean and pleasing lines as these of the Chilton monoplane are seldom found in the "ultra-light category."

training of pupils with a few hours to their credit. An Ava engine of 25 h.p. is specified, giving an estimated top speed of 87 m.p.h. The span, length and wing area are 31 ft. 9 in., 21 ft. and 130 sq. ft. At an all-up weight of 682 lb., the wing loading is 5.25 lb./sq. ft.

The Chilton Monoplane

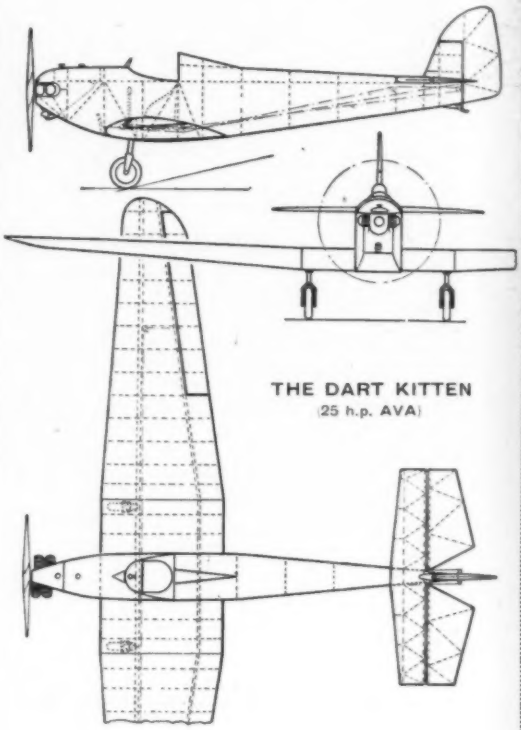
Under the guidance of the Hon. A. W. H. Dalrymple and Mr. A. R. Ward, the Chilton Aircraft Company of Chilton, Hungerford, Berks, are constructing a single-seater, low-wing monoplane with a 32 h.p. Carden engine. A cruising speed of 100 m.p.h. is hoped for and the machine should land with full load at about 32 m.p.h., the latter figure being attained largely by the use of flaps, which will also increase the gliding angle. The petrol consumption should be better than 50 m.p.g.

Every effort is being made to secure a reasonable power loading to ensure a good take-off.

Plywood covering is specified for wings and fuselage; a full-scale test has been made on the latter component which withstood a factor of 10.

Data are: Span 24 ft., length 18 ft., track 6 ft., width folded 8 ft., range 400 miles. The machine should be ready for flight-testing soon after Christmas.

The use of the 45-50 h.p. Weir engine would benefit take-off considerably. Incidentally, the company feels that this power plant may provide a brighter outlook for an economical two-seater with a really practical performance.



Percivals Move to Luton

THOUGH the imminence of the move has been known for some time it was only officially announced this week that the works of the Percival Aircraft Company are to be transferred from Gravesend to Luton Airport, Luton, Beds. (Telephone, Luton 2960.) The new address will apply as from next Saturday.

A New Wind Tunnel

THE Northampton Polytechnic (St. John Street, London, E.C.1), holds its annual prize distribution and students' conversazione to-morrow, December 11. On Saturday, the buildings will be open to members, students and friends, and a very complete programme of exhibitions and demonstrations has been arranged. The new open-jet wind tunnel will be on view in the aeronautical laboratory and a demonstration of arc and oxy-acetylene welding will be given.

The Art of the Camera

IT would indeed be an insensitive and unimaginative mind that could fail to respond to the work of the good camera artist of to-day, who, working strictly in his own medium, and scorning artificial and trick effects, produces pictures of intrinsic and completely satisfying merit.

The thought is prompted by a perusal of *Photograms of the Year* (*The Annual Review of the World's Pictorial Photographic Work*), the 42nd annual edition of which has now been published. Containing over eighty beautifully reproduced plates, together with reviews of a year's photographic progress and a guide to British Photographic Societies, *Photograms* is published at 5s. (7s. 6d. cloth) by Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1.

A Still Earlier Air Mail

IN view of the fact that the Humber-Hillman combine is taking part in the shadow scheme, it is not without interest to recall that the name of Humber was linked with aircraft in the very early days.

In 1910-11 quite a number of Humber monoplanes and biplanes were built the former being, in general appearance, somewhat reminiscent of the Blériot monoplane. Aero engines were also built. Humber aircraft figured in a rather notable event, for Comdr. Sir Walter Windham, who organised Britain's first aerial post, sent six of these machines out to the Allahabad Exhibition, with two pilots, Picquet and Davis, to give demonstrations.

Approached by the organisers of a fund in aid of an Indian students' hostel, Sir Walter conceived the idea of raising money for the purpose by running an aerial post from the Exhibition. One of the Humber machines made a flight from the Parade Ground on the banks of the Ganges, across the Jumna River to a point some distance away, where it landed and unloaded the mails, which were then taken by train in the usual way. So anxious were people to send letters by this then novel means that a large sum of money was raised by the sale of special stamps.

The success of the enterprise encouraged Sir Walter Windham, on his return to England, to organise the historic series of Hendon-Windsor mail flights.

Manufacture of aircraft by the Humber Company was resumed during the Great War, and it is said that Von Richthofen was brought down by a machine built in that factory—though, as is well known, it has never been definitely decided whether the No. 209 Squadron Camels of Capt. Brown and Lt. May or anti-aircraft guns on the ground, were responsible for "The Red Knight's" death.

Presswork Specialists' Development

IT is announced that E. G. Brown and Co., Ltd., the presswork specialists of West Road, Northumberland Park, Tottenham, London, N.17, have been turned into a public company with a capitalisation of £225,000, divided into 400,000 5½ per cent. cumulative preference shares of 5s. each, and 1,250,000 ordinary shares of 2s. each.

The financing of this business has been arranged for by the Whitehead Industrial Trust Limited, Mitre House, 177, Regent Street, London, W.1.

Work undertaken by E. G. Brown and Co., Ltd., includes aircraft tanks, ammunition boxes, generator trailers for the R.A.F., aircraft seats and mobile photographic units; they have also constructed steel bodywork for R.A.F. tenders.

COMMERCIAL AVIATION

AIRLINES — AIRPORTS

FAR EASTERN TERMINUS : The Manila-Hongkong section of Pan-American Airways' Pacific service was covered for the first time at the end of October with Mr. Juan Trippe and nineteen passengers. In due course, Imperial Airways' Penang-Hongkong and Atlantic services will be used to carry passengers as well as mail and the Anglo-American girdle will be complete. Here is the Martin *Philippine Clipper* arriving at Hongkong.

THE WEEK AT CROYDON

Those Air-raid Precautions : The Crystal Palace Fire : Heavy Winter Traffic

BY an amusing coincidence, my remarks about Air Ministry precautions against air raids at Croydon, or the lack of them, came home back to me the other day. My village, having not many more inhabitants than Croydon Airport's day population, is to hold a meeting under Col. Therm, or someone from the Gas School or the Gasworks, to discuss air-raid precautions; and somebody from the Red Cross is to be present to discuss artificial respiration, presumably when real breathing becomes impossible for want of a proper issue of gas masks. The village is unlikely to be bombed except by accident, but something is being done there, anyway. As for Croydon Airport, I visualise the last surviving inhabitant, minus a limb or two and feebly breathing bright green fumes, sitting amongst smouldering ruins and being served by an adequately gas-masked official from Whitehall with Notice to Airmen, No. 1, commencing: "In the event of an air raid . . ."

As German war pilots have since informed us, the Crystal Palace was never bombed during the war because it formed such a wonderful landmark. In the early civil aviation days, too, it was invaluable as a means of finding Croydon, and as its two towers, when brought in line and flown over, give an exact course to the aerodrome, it is still much used in weather which makes the aerodrome difficult to find.

There was considerable excitement when it caught fire last week, and joy-ride and photographic companies—Surreys, Air Taxis and Wrightways among others—reaped a rich harvest from Pressmen and sightseers. So well did Surrey Flying Services do that someone suggested that Mr. Joe Chamberlain—"passenger persuader No. 1" to that company—who was off duty at the time of the outbreak, but who appeared on the aerodrome very soon afterwards and did a roaring trade, might have had a hand in it. Joe's alibi was, however, complete, and he was prepared to bring forward the landlord as well as the barmaid as witnesses to his whereabouts.

Capt. J. T. Percy, of Imperial Airways, saw the conflagration from 7,oooft. over the Channel when some 80 miles away; and Commander van Weywrother, of K.L.M., saw the glow in the sky when at Margate, inward bound for Croydon. He had passengers from India, homing for Christmas leave, and this was their welcome to the Old Country. He deviated sufficiently to give a fairly close view to those in the cabin, but not near enough to get the force of the turbulent air above the flames, which, I hear, considerably startled people who flew right over the fire in small aeroplanes. Somebody who saw the D.C.2 lit up by the flames said it looked like a huge flying goldfish.

Alternating Weather

It is quaint how myths come into being and legends linger. I see it stated here and there and now and then that Gatwick weather is better than that of Croydon, but I believe there are no official figures in the hands of the Met. Office to prove anything of the sort. One single day when Croydon is bad and Gatwick good is sufficient evidence for local patriots, no doubt, but before the big companies use Gatwick they will want more evidence than that. Much the same story was current at one time about Gravesend, but in practice Gravesend is fairly frequently impossible when Croydon is ditto, and Lympne is then used.

Traffic, especially passenger traffic, is phenomenal for the time of year on nearly all lines. A year or two back, the loads now being carried in the depth of winter on some lines would have been regarded as excellent in the height of summer.

Although there are four services each way daily between Croydon and Amsterdam, including those of D.L.H., it has been found necessary by K.L.M. to run two Douglases instead of one on an inward service, in order to accommodate the travellers on the 8 a.m. departure from Croydon, which, of course, serves a number of other Continental countries as well as Holland. Nor is this one-way traffic only, and the two D.C.2 machines usually carry good loads from Holland, I am told.

I hear that Capt. A. S. Wilcockson and Capt. E. R. B.

Commercial Aviation

White, of Imperial Airways, who both had the bad luck to fail in one subject only for First-Class Navigators' tickets a short time ago, have now taken the exam. again and passed with flying colours. Quite a number of "Masters'" tickets have lately been obtained, too, among Imperial pilots, owing mainly to the 7 p.m. departures for Paris and Cologne, which gave the pilots the necessary number of night-flying hours. The trouble in the past has been that pilots busy flying all day got no chance to qualify.

One of the best stories lately was the one about the lady living in a road quite near the aerodrome. She rang up the company concerned and indignantly protested against an aeroplane (a low-wing monoplane, by the way) which had flown down her road "below the level of the tree-tops on either side of the road." When told that the wing span of the machine was greater than the available space beween the trees, she became really annoyed at the ridiculous nature of this flimsy excuse. Was she not to believe the evidence of her own eyes? Answer: "Not without consulting a specialist."

A. VIATOR.

The Latest Rapide

THERE are a number of new features in the 1937 D.H. Dragon Rapide, which will soon be available, and the most interesting of these concerns the fact that flaps will be fitted as standard.

In addition, metal airscrews will be optionally standard, a landing searchlight and a downward recognition light have been added to the normal night-flying equipment, and electrical engine-speed indicators are incorporated in an improved illuminated instrument panel. New systems of interior heating, ventilation and sound proofing have been developed.

Navigation in Southampton

BOTH day and evening classes in air navigation are now held by the University College of Southampton. The department of navigation is situated at South Hill, Glen Eyre Road, Bassett, and the director of studies is Mr. G. W. Wakeford, R.N.R. In the ordinary way candidates are prepared for both the First and Second Class Navigators' Licences and for the "B" licence.

The fees are extraordinarily low in the case of the special evening classes, which are held on Monday and Thursday, and these fees cover the use of the technical library, of charts and instruments. The cost of a First Class course is £8 8s., of a Second Class course £6 6s., and of the special "B" licence course £4 4s.

Coventry's Airport

THE new municipal airport for Coventry, situated at Baginton, almost next door to the old Whitley aerodrome, is now ready for service. This is remarkably good work when it is remembered that the site was only selected some sixteen months ago.

About two hundred acres have already been prepared, and Armstrong Whitworth Aircraft are now established in their additional buildings on the airport, while skeleton plans for the Alvis buildings have been passed. Councillor G. E. Roberts, the chairman of the airport committee, when giving details of the progress of the airport to the City Council, also mentioned that, when complete, Coventry's airport would cover an area of 377 acres. This would give a runway of some 2,000 yards in the direction of the prevailing wind.

Several trial take-offs and landings have already been made, and the Council will shortly be able to apply for an Air Ministry licence.

Preparing for the Atlantic

THE second of the Short Empire boats, *Caledonia*, is now at Hythe, in Southampton Water, preparatory to her trial flights, which, in turn, are preparatory to Atlantic trials.

For the moment Hythe is to be Imperial Airways' flying-boat base, and the actual position for the moorings adjoins the works and jetty of the British Power Boat Company, where a slipway is already in existence. Even if the Portsmouth negotiations had been completed, Langstone Harbour would not be ready for use. On Saturday a preliminary mail flight will be made to Alexandria, and the South African service will be started on April 1 as an all-boat scheme. The *Caledonia* was flown over to Hythe from the Medway by Capts. Cummings and Powell. Each are among the "chosen" for later Atlantic work, but it has not yet been decided, apparently, who will make the first experimental crossing.

Meanwhile the *Cavalier* has been dismantled and packed in sections for transport to Bermuda, whence she will operate the New York-Bermuda service in co-operation with Pan-American Airways. The entire hull of the boat will travel as one piece in the largest packing case that has ever been made—for aircraft, at least—and this case will, after being fitted with stabiliser floats, be towed from the steamer at Bermuda to the base, where the boat will be assembled.

More Shipping Interest

THE appointment of Mr. George A. Read to the board of Railway Air Services once again indicates the interest taken by shipping concerns in the most modern form of transport. Mr. Read is connected with Coast Lines, Ltd., a company also controlling the Belfast Steamship Co., Ltd., and Burns and Laird Lines, Ltd.

The Alpine Accident

A JUNKERS Ju.52, presumably flying on the D.L.H. Seville-Stuttgart section of the South American mail service, crashed, on December 4, in the Savoy Alps near Cluses. All the occupants, including Baron von Winterfeld, of the D.L.H. company, and at least two Spaniards, were killed. Passengers are carried on this section of the route by special arrangement, but the service is not listed as one carrying passengers in the ordinary way.

New Types for Air France

TWO new Air France types have just been passed out from the Government's technical testing centre at Villacoublay and have been handed over to the company for the 100 hours' flying necessary before the machines can be authorised to carry passengers.

One is the first of the series of six Marcel Bloch 220 sixteen-seaters (two Gnome Rhone X14 engines) and the other is the first of Six Caudron 445's (two 220 h.p. Renault engines). The latter series are light machines for feeder services with accommodation for eight passengers. The hundred hours to be flown before full passenger-carrying licences are granted are usually put in on the Paris-Marseilles route, which is regarded as the main trunk route of the Air France network.

All in One

Martin's Air Navigation, by C. W. Martin (Eversley Press, Ltd., 33 and 34, Craven Street, Strand, London, W.C.2. 21s.)

ONE of the greatest difficulties encountered by the candidate for the Second Class Air Navigator's Licence concerns the very considerable number of text books required, hardly any of which are designed solely for the use of the air navigator. Mr. C. W. Martin has succeeded in solving this problem to a very large extent by producing a manual which is designed to cover the entire syllabus with the exception of the signalling section. In the issue of October 15 *Flight* gave some preliminary details of this handbook, which, since that time, has been published.

It would obviously be impossible, in a matter of 272 pages, to cover every phase of the subject in immense detail, but Mr. Martin has done a good deal more than write a mere guide. Anybody with a reasonable basic knowledge should be able to cover the entire syllabus with the help of this book, which, we imagine, is the only one that has so far been produced for this specific purpose. The language is straightforward, there are numerous illustrations, and such things as logarithms and trigonometry have been expounded in a very simple way. Examples or typical questions are given throughout every section and the appendix consists of a set of examination papers with what are so delightfully known as "model" answers. At the back of the book are a series of charts covering these answers. While this manual is designed primarily for the examinee there should be quite a fair market for it among those more earnest amateur pilots who wish to delve a little more deeply into a fascinating series of subjects. The section on meteorology, for instance, is a good deal more interesting and easy to read than the standard books on the subject, and in such matters as D/R the author gives the reader the benefit of his long experience in simplified methods of solution. The majority of amateurs will be surprised to learn of the varied uses to which his C.D.C. may be put.

Commercial Aviation

TRANS-AFRICAN

The French Air Service to Central Africa and Beyond : 100 Per Cent. Reliability in Two Years of Régie Air Afrique's Operations.

THE Régie Air Afrique service across Africa to the Congo and Madagascar has now been in operation for two years, and it may be interesting to explain briefly how this service is operated and what has been done to ensure the 100 per cent. regularity which has so far been achieved. The initial idea of the service emanated from Commandant Dagnaux fifteen years ago, and he was the first to fly to Madagascar—in 1926. The creation of Régie Air Afrique was the result of his persevering efforts.

There were very great difficulties in the way of realising a regular air service in such regions. These difficulties resulted from atmospheric conditions peculiar to the African Continent, and especially from the existence, in the Sahara, of sandstorms which rendered visibility nil, and, in Central Africa, of destructive tornadoes.

The Air Afrique operators, the departures of whose service alternate with those of the Belgian S.A.B.E.N.A., have now gained sufficient experience of these atmospheric conditions to have no fear of them at all, and the crews are accustomed to follow their timetable only as far as possible, but always arrive to schedule at the end of the journey.

The service is operated with Marcel Bloch three-engined machines carrying a crew of three and capable of taking a load of about a ton at a cruising speed of 125 m.p.h. To this equipment larger and faster machines will be added in the early part of 1937. The successive stages of the service are: Algiers, El Golea, Aoulef, Gao, Niamey, Zinder, Fort Lamy, Fort Archambault and Bangui, with branches to Brazzaville, Stanleyville, Elisabethville, Broken Hill, Tete, Mozambique, Maintirano, and Antananarivo (Tananarive). The new timetable, in force from November 1, enables the passenger from Europe to reach the Niger in two days, Fort Lamy in three days, the Belgian Congo in four days, and Madagascar in six and a half days.

It will be seen that the Régie Air Afrique service provides the fastest method of travelling to Nigeria, Zinder being reached in less than three days after leaving London. From here it is easy to travel to Kano by car. It should be pointed out, too, that at Broken Hill the French service connects with that of Imperial Airways, thus enabling travellers from the various districts of West and Equatorial Africa to proceed to South Africa, and vice versa. Soon, when the service from South America is open to passengers, it will be possible to reach South Africa by air from Rio de Janeiro, or from Buenos Aires, by flying to Dakar, thence by French coastal service to Niamey, where the Air Afrique service is joined, and so continuing to Broken Hill.

The Air Afrique service was opened for the transport of mails in September, 1934, and for passengers in May, 1935. Nearly a thousand passengers, twenty-five tons of mails, and a good deal of freight has been carried by the French and Belgian aeroplanes since the service was opened. Furthermore, there has not been a single accident of any kind. Passengers include not only colonial officials and business men with interests in those districts, but their wives and families, travellers and big game hunters. Special hunting trips are organised by the company and sportsmen are taken over the hunting ground by men who know the habits of the game.

Inhospitable flying country indeed : Mist among the mountains of Mandara, which lie roughly south of Lake Chad and Fort Lamy. The scene is satanic in its grimness.

Two of the Marcel Blochs used by Régie Air Afrique on their African service. The photograph was taken at Elizabethville while the machines were being refuelled, one to continue towards Europe and the other towards Madagascar.

Navigational Methods

Accurate work by the meteorological stations has been the basis of regularity, working in unison with radio D/F stations. Until recently, little night flying was done, but from November 1 such flying has been a regular night occurrence in Southern Algeria, so reducing the duration of the journey. The flying crews of Régie Air Afrique machines also make use of astronomical observations, which enable them to check their D/F position. All the navigating personnel of the company are trained to make regular use of a sextant in the air and to take bearings with necessary precision. This fact is worth mentioning, as there are few air services at the present time on which the crew take such observations.

The fares are calculated on a basis of about one franc per mile, which represents, from France to the Belgian Congo, about 6,000 fr.—and a little less than 10,000 fr. to Madagascar. Freight is carried at a rate of about 40 fr. per kilogramme (18 fr. per lb.) to destinations in the Congo and beyond.

Régie Air Afrique agents issue circular tickets which cover all the expenses of the journey, when travelling either by aeroplane the whole way (for example, leaving by Air Afrique and returning by Imperial Airways) or making a combined journey by aeroplane and car, rail, or steamer. These circular tours enable Central Africa to be visited in a few weeks under conditions that were not previously possible.

AIR-MAIL COMMENTARY

New Belgian Congo Service : Liberia's First Mail Flight : Commemorating Filipino's Achievement

A NEW Sabena mail and passenger service in the Belgian Congo was opened in connection with the flight starting from Brussels on October 24. A three-engined Savoia-Marchetti S. 73 monoplane left on that date, following the usual route as far as Libenge. From here the itinerary was new, going to Elisabethville by way of Stanleyville instead of Leopoldville farther west (which is now connected by a feeder service).

As the aerodromes on the new sector will not be firm enough for the Savoias for about two months, mails were handed over at Stanleyville to a good old Fokker F.VII, which brought them in to Elisabethville on October 29—five days from Brussels, instead of six as previously.

On the return flight the Savoia left Stanleyville on October 31 and reached Brussels on November 5 in spite of half a day's delay at Colomb Béchar, caused by a burst tyre.

The dates of the accelerated service are all recorded in postmarks on covers of special design—with a rough map of the route printed in two colours—which were flown out and home from Brussels. An example bears the stamps of Belgium at one side, those of the Congo at the other.

The Savoia used (OO-AGR) has been modified for tropical flying, fitted with a refrigerator and special ventilation, and seating accommodation is reduced to eight passengers. A crew of four is carried, Capt. Hanson being in command on the inaugural trip, with Pilot Créteur as his first officer.

A well decorated cover flown on the new Sabena Belgian Congo service.

A full complement of passengers was carried on the double journey, and all seats from Brussels are booked up to January. A cruising speed of 170 m.p.h. was maintained, allowing longer hops per day without increase in any day's flying time, and so making possible the faster service.

* * *

Africa's little-known "black" republic of Liberia should get some publicity and perhaps a tidy profit from issuing half-a-dozen triangular stamps with a picture of a Ford Trimotor and the inscription, "Commemorating First Air Mail Service." And if anyone should ask for the history of this "service," it appears to have been a single flight made by a single-engined Waco biplane.

This machine, owned by the Firestone Tire and Rubber Company Inc., was shipped to Liberia in October last year, with E. J. Quigley as pilot, and on February 28 last it flew from rubber plantations at Duside, near Monrovia (the Liberian capital) to Harper, Cape Palmas, on the border of Liberia and the Ivory Coast.

The Government arranged for mail to be carried on this flight, and had "Air Mail Six Cents" overprinted on already existing stamps of three different values—only 335 of each.

Not until several months after it was all over—in fact, only a few weeks ago—were the above-mentioned stamps, showing a Ford, issued.

* * *

Commemorating another flight of some interest though little known, are recent overprinted stamps from the Philippine Islands and from Spain, which Whitfield King and Co. show me. The former are cryptically worded, "Manila-Madrid Arnacal Flight—1936," while the Spanish stamp is a little more explicit with "Vuelo Mainila Madrid 1936 Arnaiz Calvo."

This Liberian stamp, it seems, commemorates a single flight.

It appears that Antonio Arnaiz and Juan Calvo are two Filipino airmen, presumably the first of their nation to accomplish such a long flight.

The Philippine stamps are in three values, 2, 6 and 16 centavos; they were on sale only for eight hours, on September 6. Spain's are all of 30 centavos, 100,000 examples being issued.

ALEC DAVIS.

PUBLICATIONS RECEIVED

Standard Methods of Analysis of Iron, Steel and Ferro-Alloys. Price 4s. 6d. The United Steel Companies Ltd., 17, Westbourne Road, Sheffield 10.

Sky Steward, by Ken Attiwill. Price 7s. 6d. John Long Ltd., 34, Paternoster Row, London, E.C.4.

Patria's Luchtvaart-Album. Collected and Written by Henri Hegener. Uitgave N.V. Biscuitfabriek "Patria." Amsterdam, Holland.

Pirelli General Wires and Cables for Every Wiring Problem. Publication No. W. 7757., General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.

Pacific Flight, by P. G. Taylor. Price 8s. 6d., John Hamilton Ltd., 32, Bloomsbury Street, London, W.C.1.

Anything Can Happen, by George Gibbs. Price 7s. 6d., D. Appleton-Century Co., 34, Bedford Street, Strand, London, W.C.2.

Air Publication No. 1182: Parachute and Personnel Safety Equipment Manual. 1936. Price 10s. *Air Navigation Regulations Handbook. No. 1: General Procedure.* Price 6d. *No. 3: Austria.* Price 6d. All from H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

Reynolds Extruded Sections in High Strength Aluminium and Magnesium Alloys. Reynolds Tube Co., Ltd., Hay Hall Works, Tyseley, Birmingham 11.

Report on the Health of the Royal Air Force for the Year 1935. Price 2s. H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

An Airman Remembers, by Hans Schroder. Price 10s. 6d., John Hamilton Ltd.

Aces and Kings, by L. W. Sutherland. Price 7s. 6d., John Hamilton Ltd., 32, Bloomsbury Street, London, W.C.1.

NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

AIRCRAFT DEMONSTRATIONS, LTD., was registered as a private company on November 28, with a nominal capital of £1. The objects are to promote and encourage aerial navigation, and to organise and hold or assist in organising and holding aircraft shows, etc. The directors are: Fdk. M. MacGregor and Sidney R. Vennervald. The registered office is at West India House, Leadenhall St., London, E.C.

ABRIDGE FLYING CLUB, LTD., was registered as a public company on November 26, with a nominal capital of £1,000 in 4,000 ordinary shares of 5/-. The objects are to establish and conduct and control a flying club, etc. The directors are: Lt.-Col. Amos H. Ronan, (director, Atlas Air Services, Ltd.), John J. Flynn, (director, Atlas Air Services, Ltd.), Richard V. D. Beaumont, Joseph W. Anderson, (director, Atlas Air Services, Ltd.). The registered office is at Abridge Aerodrome, Abridge, Essex.

AERONAUTICAL PATENT SPECIFICATIONS

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

(*Published, December* 10, 1936.)

7305. C. L. W. AVIATION CO. LTD., and WELMAN, F. S.: Screw Propellers (456,448).

14141. TOWNEND, H. C. H.: Air-cooled aero engines with a view to securing an improved cooling effect (456,819).

18418. COWDRAY, C. L.: Mounting of radiators of internal-combustion engines used in aircraft (456,674 .

20214. CALVER, B. G.: Securing of sheet members to a wooden batten by means of staples (456,596).

1846. RUSPOLI, E. A.: Device for controlling aircraft motor (456,702).

8350. AEROPLANES MORANE-SAULNIER SOC. ANON. DE CONSTRUCTIONS AERONAUTIQUES: Landing gear for aeroplanes (456,632).

8913. TOMLINSON, A. V. (Compagnie des Friens Westinghouse): Remote control device for the ailerons of aircraft and for other purposes (456,708).